INTERSTATE 405 Project Team
Congestion Relief & Bus Rapid Transit Projects

APPENDIX W1

I-405, SR 520 TO SR 522 – KIRKLAND NICKEL PROJECT WETLANDS DISCIPLINE REPORT (FEBRUARY 2005)

I-405, SR520 to SR522 Stage 1 (Kirkland Stage 1)

Draft RFP
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Washington State Department of Transportation

I-405, SR 520 to SR 522
Kirkland Nickel Project

Wetlands
Discipline Report

Washington State
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Summary

What are wetlands and why are they important?

Wetlands are formally defined in the *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997) and the US Army Corps of Engineers *Wetlands Delineation Manual* (Environmental Laboratory, 1987). Wetlands are areas that are typically inundated or saturated by surface or groundwater to the extent that they support vegetation typically adapted for life in saturated or inundated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. In certain situations, wetlands can also include man-made features like stormwater facilities. Wetlands play important roles that provide valuable benefits to the environment and society. The benefits include improvements to water quality, stormwater attenuation, aesthetics, historical and cultural value, and habitat for a variety of plants and animals.

What studies were completed?

The Washington State Department of Transportation (WSDOT) is planning construction to improve Interstate 405 (I-405) between approximately State Route (SR) 520 in the City of Bellevue and SR 522 (hereafter referred to the Kirkland Nickel Project) in the City of Bothell in King County, Washington (see Figure 1). Studies included wetland reconnaissance and delineation, wetland characterization, state and local rating, and functional assessment.

What is the study area for this analysis and how was it determined?

The study area includes areas within the I-405 right of way and storm water facilities footprints because this is where disturbance related to construction will occur. The study area for the Wetlands Discipline Report includes the right-of-way adjacent to the existing southbound lanes between the northern extent of access ramps to SR 520 and the southern extent of southbound ramps from SR 522 and the right-of-way adjacent to the existing northbound lanes. The study area also included parcels where proposed drainage system improvements would occur.

What is the affected environment?

The affected environment includes developed and undeveloped areas on both sides of I-405. Construction improvements would occur within the WSDOT right-of-way, WSDOT properties, and city or county-owned parcels. The study area boundaries were determined using preliminary engineering footprint drawings.

Thirty-three wetlands were delineated by WSDOT. Overall, wetlands in the affected environment are generally degraded with a history of disturbance due to road or interchange construction and past development. Fourteen wetlands have been modified as part of the construction of stormwater treatment or conveyance facilities. The wetlands are grouped into three wetland types: emergent, scrub-shrub, and forested. Emergent wetlands are primarily dominated by nonnative vegetation such as reed canarygrass, bentgrass, Himalayan blackberry, and soft rush. The majority of wetlands in the affected environment are emergent. Scrub-shrub and forested wetlands are characterized by deciduous species such as red alder, willow, and black cottonwood. The larger scrub-shrub or forested wetlands provide storage capacity for flood control and supports valuable habitat functions. These higher value wetlands typically occur adjacent to the project area outside of the WSDOT right-of-way.

Twenty-four of the wetlands in the Kirkland Nickel project study area are Category 4 wetlands according to the Revised Washington Department of Ecology Wetlands Rating System. There are no Category I wetlands in the study area. Two Category II wetlands, and seven Category III wetlands occur within the study area.

Would the proposed project have an impact on wetlands?

Permanent and temporary impacts to wetlands will occur with the proposed operation of the improved I-405 freeway.

Would there be any construction impacts?

Construction would result in the loss (filling) or temporarily disturbing an estimated 1.808 acres of wetland. Of this total, approximately 1.599 acres would be permanently filled and 0.191 acres would be temporarily disturbed during construction and subsequently restored. Another 0.018 acres of wetland would be indirectly impacted. Temporary construction impacts may include sediment transport and erosion from disturbed soils onsite due to construction activities. Indirect wetland impacts would occur where most of the existing wetland area would be permanently filled such that the remainder was not likely to function at the same levels as occurred prior to construction.

What would be the effect of the unavoidable loss of the identified wetland resources?

The project will result in unavoidable losses of 1.599 acres of wetland within the study area due to filling to facilitate the proposed construction. This will reduce wetland area, as well as wetland functions and values in the Kirkland Nickel Project study area. As a result, the total area and the associated wetland functions in values will be unavoidably lost in some basins within the study area, resulting in reductions of wetland habitat in each area. The overall effect of these losses would be small, however, because the filled wetlands provide relatively minor value as habitat given their proximity to I-405. Most of the loss (1.051 acres) will occur to Category 4 wetlands. The project will result in no impacts to Category 2 wetlands. The remaining loss, 0.548 acres, will occur to Category 3 wetlands. Off-site wetland mitigation would be constructed to offset anticipated impacts, so that implementation of the I-405 Corridor Program project will result in no net loss of wetlands.

What impacts would result if the No Build Alternative is adopted?

No additional impacts to wetlands are expected if the No Build Alternative were adopted. Some wetlands within the right-of-way are currently disturbed on an on-going basis by vegetation and stormwater conveyance system maintenance and the functions of these wetlands will be reduced by these activities.

What mitigation measures are proposed to avoid and/or minimize impacts?

During the preliminary design process, WSDOT made several adjustments to avoid or minimize impacts to wetlands and their buffers. The most common avoidance and minimization measures included moving stormwater facilities and requiring retaining walls to reduce the extent of fill necessary to construct the road improvements.

WSDOT proposes several measures to compensate for impacted wetland functions and values using a combination of wetland creation and enhancement of existing degraded wetlands at one or more off-site locations. To compensate for the reduction of water quality and water quality functions provided by the impacted wetlands, WSDOT will also

implement drainage system improvements to provide stormwater treatment and detention within each basin.

During project-level design, WSDOT will identify specific best management practices (BMPs) and other measures to be incorporated into construction specifications developed during the final design process. BMPs will be implemented during construction and operation of the project to minimize sedimentation and/or contamination of wetlands.

Prior to final development of project-specific BMPs, WSDOT will meet with federal, state, and local agencies to identify mitigation priorities and options for avoiding or minimizing wetland losses, and to compensate for any losses. In accordance with Council on Environmental Quality (CEQ) regulations pertaining to mitigation, BMPs sequencing includes:

1. Avoidance measures that eliminate the onset of impacts
2. Minimization measures proposed to decrease the magnitude or severity of the impact
3. Rectification measures that are part of the project and repair or restore resources
4. Reduction or eliminating measures that soften the impacts
5. Compensation measures designed to offset unavoidable adverse impacts
6. Monitoring measures that become part of the project to ensure that resources are not further degraded by the project

Acronyms and Abbreviations Used in This Report

Acronym	Meaning
BMPs	best management practices
BNSF	Burlington Northern Santa Fe Railway
BRT	bus rapid transit
Corps	United States Army Corps of Engineers
EA	environmental assessment
Ecology	Washington Department of Ecology
EEI	Early Environmental Investment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FAC	facultative
FACU	facultative upland
FACW	facultative wetland
FHWA	Federal Highway Administration
GMA	Washington State Growth Management Act
HOV	high-occupancy vehicle
HPA	Hydraulic Project Approval
ITS	intelligent transportation systems
MP	milepost
NEPA	National Environmental Policy Act
NI	no indicator status
NL	not listed
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OBL	obligate
OHWM	ordinary high water mark
PEM	palustrine emergent
PFO	palustrine forested
POW	palustrine open water
PSS	palustrine scrub-shrub
ROD	Record of Decision
SEPA	State Environmental Policy Act

Acronym	Meaning
SMA	Washington State Shoreline Management Act
SOV	single-occupancy vehicle
SR	State Route
TDM	transportation demand management
TMAs	transportation management associations
UPL	upland
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
WDFW	Washington Department of Fish and Wildlife
WIS	wetland indicator status
WSDOT	Washington State Department of Transportation

Glossary

Term	Meaning
100-year floodplain	The flood with a 100-year recurrence interval; those areas identified as Zones A, A1-30, AE, AH, AO, A99, V, V1-30, and VE on most current Federal Emergency Management Agency (FEMA) Flood Rate Insurance Maps, or areas identified as 100-year floodplain on applicable local Flood Management Program maps.
404 permit	A permit issued by the US Army Corps of Engineers under Section 404 of the federal Clean Water Act which allows an activity (filling) within a wetland. A 404 permit usually requires compensation or mitigation for the allowed use in a wetland.
anaerobic	A situation in which molecular oxygen is absent (or effectively so) from the environment.
atypical situation	Areas in which one or more parameters (vegetation, soil, and/or hydrology) have been sufficiently altered by recent human activities or natural events to preclude the presence of wetland indicators of the parameter. "Recent" is intended to mean that period of time since legal jurisdiction of an applicable law began.
best management practices (BMPs)	Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollutant discharges.
buffer	A designated area along the buffer of a stream or wetland that is regulated to control the negative effects of adjacent development from intruding into the aquatic resource.
concretion	A local concentration of chemical compounds (e.g., calcium carbonate, iron oxide) in the form of a grain or nodule of varying size, shape, hardness, and color. Concretions of significance in hydric soil are usually iron and/or manganese oxides occurring at or near the soil surface, which develop under conditions of prolonged soil saturation.
dominant species	A plant species that exerts a controlling influence on or defines the character of a community.
emergent	A plant that grows rooted in shallow water, the bulk of which emerges from the water and stands vertically.
emergent wetland	In the USFWS classification system (Cowardin et al., 1979), a wetland characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens.

Term	Meaning
enhancement	An improvement in the functions and values of an existing wetland typically through the planting of native plant species.
Facultative (FAC):	Plant species that are equally likely to occur in wetlands (estimated probability 34 to 66 percent) or non-wetlands. See wetland indicator status in this glossary.
Facultative upland (FACU):	Plant species that usually occur in non-wetlands (estimated probability 67 to 99 percent) but are occasionally found in wetlands. See wetland indicator status in this glossary.
Facultative wetland (FACW):	Plant species that usually occur in wetlands (estimated probability 67 to 99 percent) but are occasionally found in non-wetlands. See wetland indicator status in this glossary.
fill material	Any material placed in an area to increase surface elevation.
forested wetland	In the USFWS classification system (Cowardin et al., 1979), a wetland characterized by woody vegetation that is 20 feet tall or taller.
gleyed	A soil condition resulting from prolonged soil saturation, which is manifested by the presence of bluish or greenish colors through the soil mass or in mottles (spots or streaks) among other colors. Gleying occurs under anaerobic soil conditions resulting from soil saturation, by which iron is reduced predominantly to the ferrous state.
groundwater	That portion of the water below the ground surface that is under greater than atmospheric pressure.
herbaceous	Having the characteristics of an herb; a plant with no persistent woody stem above the ground.
homogenous vegetation	A situation in which the same plant species association occurs throughout an area.
hydric soil	A soil that formed under conditions of saturation, flooding, or ponding long enough to develop anaerobic conditions in the upper part.
hydrology	The science dealing with the properties, distribution, and circulation of water.
hydrophyte	Any plant growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.
hydrophytic vegetation	The sum total of plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.

Term	Meaning
in-kind compensation	Compensation for lost wetland habitat with a replacement wetland of the same habitat type.
inundation	A condition in which water from any source temporarily or permanently covers a land surface.
invasive plant species	Plant species that become established easily in disturbed conditions, reproduce readily, and often establish monocultures. Most invasive plants are non-native species (i.e., were introduced to the Northwest intentionally or unintentionally by humans). Examples of common invasive species in the Pacific Northwest are scotchbroom, Canada thistle, hedge bindweed, English ivy, reed canarygrass, and purple loosestrife.
lacustrine	In the USFWS classification system (Cowardin et al., 1979), a freshwater area (having less than 0.5 parts per thousand ocean-derived salts) with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) having less than 30 percent coverage of trees, shrubs, persistent emergents, mosses, or lichens; and (3) total area exceeds eight hectares (20 acres). For areas less than 20 acres, an area is considered lacustrine if it has an active wave-formed or bedrock shoreline or is deeper than 6.6 feet in the deepest part.
mitigation	Defined in WAC 197-11-766 as: (1) avoiding the impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; (5) compensating for the impact by replacing, enhancing or providing substitute resources or environments: and/or (6) monitoring the impact and taking appropriate corrective measures.
mottles	Spots or blotches of different color or shades of color interspersed within the dominant color in a soil layer, usually resulting from the presence of periodic anaerobic soil conditions.
Obligate (OBL)	Plant species that almost always occur in wetlands under natural conditions (estimated probability greater than 99 percent). See wetland indicator status in this glossary.

Term	Meaning
ordinary high water mark	The line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; changes in the character of soil or vegetation; shelving; or the presence of a line of litter or debris.
out-of-kind compensation	Compensation for lost wetland habitat with a replacement wetland of a different habitat type
palustrine	In the USFWS classification system (Cowardin et al., 1979), freshwater areas (having less than 0.5 parts per thousand ocean-derived salts) dominated by trees, shrubs, persistent emergents, mosses, or lichens. They can be non- tidal or tidal. Palustrine also includes wetlands lacking this vegetation but having the following characteristics: (1) area less than 20 acres; (2) no active wave- formed or bedrock shoreline; (3) water depth in the deepest part is less than 6.6 feet at low water.
persistent emergents	Emergent plants that remain standing at least until the beginning of the next growing season.
project area	All areas within the Kirkland Nickel Project improvement area encompassing approximately 7.6 miles from the north side of the I-405 and SR 520 interchange and extends northward to the south side of the I-405 and SR 522 interchange.
project vicinity	Land area including the study area and the project area and surrounding lands that provide information necessary to evaluate the project. This is not a distinct area, but varies depending on the size, type, and location of the various wetlands within the study area.
restoration	To improve a disturbed or altered wetland by returning wetland parameters that may be missing. The restoration may return an original wetland habitat.
rhizosphere	The zone of soil in which interactions between living plant roots and microorganisms occur.
riverine	In the USFWS classification system (Cowardin et al., 1979), freshwater areas (having less than 0.5 parts per thousand ocean-derived salts) that are contained within a channel and are not dominated by trees, shrubs, and persistent emergents; for example, rivers and streams.
saturated soil conditions	A condition in which all easily drained voids (pores between soil particles) in the root zone are temporarily or permanently filled with water to the soil surface at pressures greater than atmospheric.

Term	Meaning
scrub-shrub	In the USFWS classification system (Cowardin et al., 1979), areas dominated by woody vegetation less than 20 feet tall. The species include tree shrubs, young trees, and trees or shrubs that are stunted because of environmental conditions.
soil matrix	The portion of a given soil having the dominant color. In most cases, the matrix will be the portion of the soil having more than 50 percent of the same color.
study area	Areas specifically evaluated for the presence of wetlands as defined by the Scope of Work for this project. This area is similar to the project area, but only includes areas within the I-405 right of way and storm water facilities footprints where construction would occur.
wetland	Wetlands are formally defined by the US Army Corps of Engineers (Federal Register, 1982), the US Environmental Protection Agency (Federal Register, 1988), the Washington Shoreline Management Act of 1971 (SMA) (Ecology, 1991), and the Growth Management Act (GMA) (Ecology, 1992) as: > … those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (Federal Register, 1982, 1986). The SMA and the GMA definitions add: > Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990 that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificially-created wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.
wetland boundary	The point on the ground at which a shift from wetlands to nonwetlands or aquatic habitat occurs. These boundaries usually follow topographic contours.
wetland hydrology	The total of all wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation.

Term	Meaning
wetland indicator status (WIS)	Categories of plant species based upon the estimated probabilities (expressed as a frequency of occurrence) of a species occurring in a wetland or non-wetland. Wetland indicator status categories include the following: Obligate (OBL): species that almost always occur wetlands under natural conditions (estimated probability >99 percent). Facultative wetland (FACW): species that usually occur in wetlands (estimated probability 67 to 99 percent) but are occasionally found in non-wetlands. Facultative (FAC): species that are equally likely to occur in wetlands (estimated probability 34 to 66 percent) or non-wetlands. Facultative upland (FACU): species that usually occur in non-wetlands (estimated probability 67 to 99 percent) but are occasionally found in wetlands. Upland (UPL): species that almost always occur in non-wetlands under normal conditions (estimated probability >99 percent). Not listed (NL): species that are not listed and are presumed to be upland species. No indicator status (NI): species that have not yet been evaluated. A (+) or (-) following the WIS of a given species signifies a greater or lesser likelihood of being found in wetland conditions.

1.0 Introduction

1.1 Study Objectives

For the I-405, SR 520 to SR 522 - Kirkland Nickel Project (hereafter referred to as the Kirkland Nickel Project), WSDOT is planning construction to improve I-405 between approximately SR 520 in the City of Bellevue and SR 522 in the City of Bothell in King County, Washington (see Figure 1). These improvements are hereafter called the Kirkland Nickel Project.

This Wetlands Discipline Report has been prepared to support environmental documentation for the Kirkland Nickel Project. Project biologists completed wetland investigations and prepared this report. The objectives of the wetland study include:

- Determine the location and condition of wetlands within the study area
- Evaluate project-related effects
- Outline appropriate measures for project planning and to help the project team meet federal, state, and local regulatory requirements.

2.0 Project Description

3.0 Methodology

Methods discussed below include procedures used for wetlands reconnaissance and delineation, wetlands rating, and a functions and values assessment for wetlands in the study area, as summarized in this discipline report. The methods used for estimating the effects on wetlands are also discussed.

3.1 Study Area

WSDOT identified the study area to the project biologists based on the anticipated construction footprint. The study area for the Kirkland Nickel Project includes the right-of-way adjacent to the existing southbound lanes (generally the west side or the road corridor and undeveloped center median) between the northern extent of access ramps to SR 520 and the southern extent of southbound ramps from SR 522.

The study area also includes the right-of-way adjacent to the existing northbound lanes (generally the east side of the road corridor between approximately Northeast 65th Street and the Burlington Northern Santa Fe Railway undercrossing north of Northeast 116th Street inclusive of the Northeast 116th Street interchange). The study area also includes parcels beyond the right of way in and around proposed drainage system improvements and King County- and WSDOT-owned parcels between the existing Brickyard Park and Ride and I-405 at approximately 15530 Juanita-Woodinville Way Northeast.

3.2 Methods of Investigation

Project biologists followed two levels of investigation for identifying wetlands as required by the methodology: a review of existing information and an onsite investigation.

3.2.1 Review of Existing Information

Project biologists conducted a review of existing literature, maps, and other materials to identify wetlands or site characteristics indicative of wetlands in the study area.

Project biologists reviewed the following documents:

- US Geological Survey 1:24,000 Topographic Map, Bothell quadrangle (1981), Kirkland quadrangle (1973)
- City of Kirkland orthophoto topographic map set (1985)
- Soil Survey of King County Area, Washington (Snyder et al., 1973)
- Hydric Soils of the State of Washington (NRCS, 1995)
- National Wetland Inventory, Bothell quadrangle (USFWS, 1988), Kirkland quadrangle (1987)
- Priority Habitats and Species Data (WDFW, 2003)
- King County Sensitive Areas Map Folio (King County, 1990)
- Kirkland's Streams, Wetlands and Wildlife Inventory (The Watershed Company, 1998)
- City of Bothell Comprehensive Plan (City of Bothell, 1997)

3.2.2 Onsite Investigation

Wetland Delineation

Project biologists delineated wetlands in the field between mid-February and November 2004. Most wetlands were delineated in February and March 2004. To determine the presence and extent of wetlands characteristic for areas within the study area, project biologists used methods defined in the *Washington State Wetlands Identification and Delineation Manual* (Ecology, 1997), a manual consistent with the *Corps of Engineers Wetlands Delineation Manual* ("1987 Manual") (Environmental Laboratory, 1987) .

Washington State and all local governments must use the state delineation manual to implement the Shoreline Management Act (SMA) and/or the local regulations adopted pursuant to the Growth Management Act (GMA). The methodology outlined in the manual requires the presence of three essential characteristics of wetlands before an area was delineated: (1) wetland hydrology, (2) hydric soils, and (3) hydrophytic vegetation. Field indicators of these three characteristics must all be present in order to make a positive wetland determination. However, exceptions to this rule are permitted where problem areas or atypical situations are encountered.

Project biologists followed the "routine onsite determination method" to determine the wetland boundaries based on the presence or absence of wetland hydrology, hydric soils, and wetland vegetation as required by the Washington Department of Ecology (Ecology) (1997), as discussed below.

Hydrology

Water is an essential element of wetland areas. Ecology (1997) requires that water be present in order for wetlands to exist; however, it need not be present throughout the entire year. Project biologists considered wetland hydrology to be present when they found specific indicators in a suspected wetland area. Indicators of wetland hydrology include ponding or soil saturation, water marks, drift lines, drainage patterns, sediment deposits, oxidized rhizospheres, water-stained leaves, and local soil survey data. Where biologists observed positive indicators of wetland hydrology, they assumed that wetland hydrology occurs for a sufficient period of the growing season to meet the wetland criteria, as described by Ecology (1997).

Soils

Ecology (1997) requires that an area have hydric soils to be considered a wetland. Hydric soils, which are indicative of wetlands, are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile (Federal Register, 1994). The Natural Resources Conservation Service (NRCS), in cooperation with the National Technical Committee for Hydric Soils, has compiled lists of hydric soils (NRCS, 1995). These lists identify soil series, mapped by the NRCS that meet hydric soil criteria. However, a map unit of non-wetland (non-hydric) soil can commonly include some hydric soil, and vice versa. Therefore, project biologists conducted a field examination of all suspected wetlands to verify the presence of hydric soil conditions. Biologists also evaluated soil conditions following guidelines developed by the NRCS (1998) that focus on identifying indications of anaerobic conditions.

Hydric soils exhibit certain characteristics, collectively known as "redoximorphic features," that can be visually observed (Vepraskas, 1999). Redoximorphic features include high organic content, accumulation of sulfidic material (rotten egg odor),

greenish- or bluish-gray color (gley formation), spots or blotches of different color interspersed with the dominant (or matrix) color (mottling), and dark soil colors (low soil chroma) (NRCS, 1998; Vepraskas, 1999). Project biologists determine and describe soil colors by both common color name (for example, “dark brown”) and by a numerical description of their hue, value, and chroma (for example, 10YR 2/2) as identified on a Munsell soil color chart (Munsell Color, 2000).

Vegetation

Wetlands must be dominated by water-tolerant (hydrophytic) plants (Ecology, 1997). Project biologists determined that wetland vegetation was present when greater than 50 percent of the dominant species (see Glossary) within each vegetative stratum had a wetland indicator status of OBL, FACW, or FAC. In addition to the wetland indicator status, project biologists also relied on other indicators of hydrophytic vegetation that included prolonged inundation and/or saturation and regional knowledge of plant communities.

Common plant names are used throughout this text. The common and taxonomic (scientific) names and wetland indicator status for each plant noted along the project corridor are presented in Appendix A. Scientific nomenclature of all plant species follows that of the US Fish and Wildlife Service (USFWS) (1997).

Determination of Wetland Boundaries

Project biologists established formal data plots in areas of relatively homogeneous vegetation to evaluate conditions within or adjacent to a suspected wetland. Project biologists first recorded information for each of the required wetland parameters on standardized data forms as described in Ecology (1997) and then used this information to distinguish wetlands from non-wetlands following the required methodology.

Project biologists used a system of paired plots (one upland data plot and one wetland data plot) along the wetland boundary to characterize each wetland in the study area. Project biologists characterized wetlands with more than one vegetation community by multiple wetland plots. If wetlands were determined to be present in the study area, biologists delineated and identified their boundaries with sequentially-numbered colored flagging. They also marked data plot locations with colored flagging.

Wetland Habitat Classification

Project biologists applied the Cowardin classification system (Cowardin et al., 1979) to each delineated wetland based on the dominant vegetation stratum present, as defined in the Glossary. Specifically, project biologists assigned each wetland to one of the following classes: palustrine emergent (PEM), palustrine scrub-shrub (PSS), palustrine forested (PFO), and palustrine open water (POW).

Wetland Rating System

Project biologists rated the delineated wetlands using the *Washington State Wetland Rating System for Western Washington - Revised* (Hruby, 2004). This system was designed to differentiate between wetlands based on their sensitivity to disturbance, their significance, their rarity, our ability to replace them, and the functions they provide. Project biologists then ranked wetlands into four categories, using the following criteria:

- Category I wetlands represent a unique or rare wetland type; or are more sensitive to disturbance; or are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime.

- Category II wetlands are difficult, though not impossible, to replace, and provide high levels of some functions.
- Category III wetlands have a moderate level of function. They have been disturbed in some ways, and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.
- Category IV wetlands have the lowest levels of functions and are often heavily disturbed.

Project biologists used the Draft Wetland Rating Form – Western Washington to rank wetlands in the Kirkland Nickel Project area. The rating system requires the user to collect specific information about the wetland in a step-by-step process.

Wetland Functions and Values

WSDOT has developed a qualitative method of assessing functions for wetlands along linear corridor projects. The *Wetland Functions Characterization Tool for Linear Projects* (Null et al., 2000) describes the method and explains how to assess wetland functions. The method is intended to provide a relatively quick and consistent means of ascertaining general wetland functional characterizations and relies on best professional judgment. The WSDOT method assesses the following functions:

Flood flow alteration	Habitat for amphibians
Sediment removal	Habitat for wetland-associated mammals
Nutrient and toxicant removal	Habitat for wetland-associated birds
Erosion control and shoreline stabilization	General fish habitat
Production of organic matter and its export	Native plant richness
General habitat suitability	Educational or scientific value
Habitat for aquatic invertebrates	Uniqueness and heritage

To evaluate the ability of wetlands along the I-405 Project Corridor to perform the functions listed above, project biologists documented site conditions on data forms during on-site investigation. Positive answers to several qualifiers generally indicate the presence of factors important for the particular function or value (Null et al., 2000). A summary of this assessment is presented in Appendix B. Using best professional judgment, the biologists then determined if that particular function is likely or not likely to be performed by each wetland.

Wetland Area Calculations

Project surveyors delineated the wetland boundaries and technicians calculated the area of each wetland using MicroStation. The original areas were calculated in square feet by the technicians and then the biologists converted them to the nearest thousandths of an acre for the purpose of discussion in this document.

Wetland Fill Estimates

Project biologists calculated the area of direct and indirect wetland fill by superimposing MicroStation design files of the proposed roadway improvements with the wetland data. They also calculated the sizes of the overlapping areas, as well as areas of temporary fill or disturbance, based on a 10-foot offset from all improvements.

The project team provided a conservative estimate of roadway development cut and fill boundaries. This means the area designated for development was larger than the anticipated project footprint so that the area of potentially affected wetlands would not be understated.

3.3 Studies and Coordination

3.3.1 Resource, Regulatory, and Jurisdictional Agencies

Preparers of this discipline report are not required to coordinate with resource, regulatory or jurisdictional agencies and coordination with these agencies does not commonly occur at this stage of the environmental review process. The US Army Corps of Engineers (the Corps) will verify the wetland delineation boundaries during the permitting stage of the Kirkland Nickel Project, which will occur concurrently with final design.

Numerous federal, state, and local regulations govern development and other activities in or near wetlands. At each level, several agencies are typically charged with such powers. Wetland regulations are discussed in more detail under Section 4.3.

4.0 Affected Environment

The following sections describe existing environmental information for the project vicinity and the findings of the wetland determinations made in the field. Wetland ratings established by state and local jurisdictions, wetland classifications, wetland functions and values, and wetland proximity to streams are also described below.

4.1 Existing Information

The *National Wetland Inventory* (NWI) (USFWS, 1987 and 1988) *and King County Sensitive Areas Map Folio* (King County, 1990) contain few mapped wetlands in the study area. Palustrine forested (PFO) and palustrine emergent (PEM) wetlands identified in these documents are associated with the Totem Lake area, Yarrow Creek, and the Sammamish River. These resources also contain maps of a few smaller palustrine scrub-shrub (PSS) and/or PEM wetlands.

The Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species database identifies the wetlands mapped near Totem Lake as priority habitat (WDFW, 2003), which project biologists delineated. All other priority wetland habitats identified in the vicinity are located outside of the study area. These include wetlands associated with Lake Washington, Forbes Lake, and the Forbes Creek riparian area in the southern half of the study area and wetlands draining to the Sammamish Slough in the northern end of the study area.

Wetlands identified in the *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company, 1998) replicate those reported in the NWI and WDFW Priority Habitats database. The following mapped wetlands occur primarily outside of the WSDOT right-of-way:

- A wetland area near Yarrow Creek, close to the southern project boundary, and east of a concrete noise wall near milepost (MP) 16.
- Two wetlands south of the NE 116th Street interchange exit between MP 19.3 and 19.5, with small portions extending over the right-of-way boundary. Project biologists identified and delineated both wetlands.
- A large wetland in the Totem Lake area west of I-405 that connects via a culvert beneath 116th Avenue NE to a larger forested wetland near MP 19.7. Project biologists assessed the portion of the wetland within the WSDOT right-of-way.
- The remaining wetlands identified in the *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company, 1998) are outside of the study area.

The *City of Bothell Comprehensive Plan* (City of Bothell, 1997) contains critical areas maps, including wetlands and watershed boundaries. The northern mile of the project area lies within the Bothell city boundaries and contains two large mapped wetlands associated with the Sammamish River and Juanita Creek, which are outside the WSDOT right-of-way.

The US Soil Conservation Service, now named the Natural Resources Conservation Service (NRCS), has identified six soil units in the study area (Snyder et al., 1973). Seattle muck is the only unit classified as a hydric soil (NRCS, 1995). The other soil units are Alderwood gravelly sandy loam, Everett gravelly sandy loam, Kitsap silt loam, Ragnar fine sandy loam, and Urban land. Although these five soil units are not classified as hydric soils, they may contain hydric soil inclusions.

4.2 Wetland Regulations

Numerous federal, state, and local regulations govern development and other activities in or near wetlands. At each level, several agencies are typically charged with such powers.

4.2.1 Federal

Federal Executive Order 11990 of 1978 requires all federal agencies to consider wetland protection as an important part of their policies. Specifically, policies seek to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural benefits and values. The US Department of Transportation complies with this mandate to the fullest extent practicable during the planning, construction, and operation of transportation facilities and projects (DOT Order 5660.1A; Executive Order 11990). WSDOT projects with federal funding, including the Kirkland Nickel Project, are subject to this order.

The Corps regulates placement of dredged or fill material waterward of the ordinary high water mark (OHWM) in waters of the United States, including wetlands, under Section 404 of the Clean Water Act. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." A Section 404 permit may be required if a proposed project involves filling wetlands.

The Corps has established two types of permit programs under Section 404: Nationwide and Individual. Nationwide permits are issued when a proposed activity would have minimal adverse impacts to wetlands. All other projects are permitted under the Individual process. The Corps determines which permitting process is used for a proposed project. In the case of the Kirkland Nickel Project, the Corps will require that wetland impacts be avoided or minimized to the extent practicable, and mitigation will likely be required for unavoidable wetland impacts.

The Corps will verify delineated wetland boundaries during the project permitting stage. Project biologists will accompany the Corps in the field during verification.

4.2.2 State

State of Washington Executive Order 89-10, Protection of Wetlands, commits state agencies to a "no net loss" wetland policy and encourages sensitive site design and planning on a watershed basis to avoid or minimize damage to wetlands. Executive Order 89-10 designates Ecology to provide guidance on wetland issues. State agencies are instructed to develop an action plan to lessen the loss of wetlands and to preserve or enhance the values of wetlands. The WSDOT *Environmental Procedures Manual* (2004a) includes an action plan for wetland protection. WSDOT policy is "to avoid to the fullest extent practicable any activities that would adversely affect wetlands during the design, construction, and maintenance of the state transportation system" (WSDOT, 2004a).

Wetland protection is further promoted by Section 401 of the federal Clean Water Act, which directs each state to certify that proposed in-water activities will not adversely affect water quality or violate state aquatic protection laws. Ecology administers the Washington state certification program, which is usually triggered through a Corps Section 404 permit application. Ecology responds with either approval, approval with conditions, denial, or a request for delay due to lack of information. Any conditions attached to the 401 Certification become part of the Corps Section 404 permit.

Project biologists preliminarily rated wetlands identified in the Kirkland Nickel Project study area using criteria specified in the *Washington State Wetland Rating System for Western Washington- Revised* (Hruby, 2004) and described previously in Section 3.2.2 of this report. A Draft Wetland Rating Form – Western Washington was completed for each delineated wetland (see Appendix C). Table 4-1 summarizes the project's wetland classifications based on the state rating system.

To protect fish and fish habitat from construction-related activities, the WDFW requires Hydraulic Project Approval (HPA) for any work conducted within the OHWM of waters of the state (RCW 75.20). An HPA is required for any project that will use, divert, obstruct, or change the natural flow or bed of any state waters and includes, but is not limited to, such projects as streambank protection, culvert installation, gravel removal, and placement of outfall structures. Although the HPA typically refers to work conducted waterward of the OHWM, it also applies to work conducted landward of the OHWM if the work will directly impact fish life or habitat (such as trees adjacent to the stream). If required for this project, as determined by the Fish and Aquatic Resources Discipline Report, the HPA will be included with the Section 404 permit for the project.

Table 4-1: Wetland Ratings – Washington Department of Ecology, I-405 Kirkland Nickel Project

Wetland Identifier	Area (acres)	Cowardin Classification	State Rating (Ecology)
16.2R	0.847	PFO	II
16.3L	0.031	PEM	IV
16.5L	0.064	PEM	IV
17.1R	0.021	PEM	IV
17.3R	0.048	PEM	IV
17.7R	0.096	PEM	IV
18.0R	0.101	PEM	IV
18.05L	0.210	PEM	IV
18.06L	0.047	PEM	IV
18.1R	1.309	PFO	IV
18.15R	0.050	PEM	IV
18.2R	0.068	PFO	IV
18.3R	0.028	PFO	IV
18.4R	0.037	PEM	IV
19.27R	0.105	PEM	IV
19.3R	0.248	PFO	III
19.5L	0.574	PEM	IV
19.6L	0.011	PEM	IV
19.6R	0.051	PEM	IV
19.7R	0.252	PSS	III
19.8L	0.341	PEM	IV

Wetland Identifier	Area (acres)	Cowardin Classification	State Rating (Ecology)
19.9L	0.443	PFO	III
19.9R	0.087	PEM	IV
20.0L	0.080	PEM	IV
20.34L	0.279	PEM	III
20.35L	0.165	PEM	IV
20.4L	2.759	PSS	II
21.6L	0.093	PFO	IV
21.7L	0.242	PFO	IV
21.8L	0.054	PEM	IV
22.5L	0.025	PFO	III
22.8L	1.156	PFO	III
23.2L	0.307	PFO	III
TOTAL	**10.156**		

Wetland mitigation by WSDOT for their projects are currently subject to the *Implementing Agreement between The Washington State Department of Transportation and the Washington State Department of Ecology Concerning Wetlands Protection & Management* dated July 1, 1993 (hereafter cited as the 1993 Implementing Agreement). ent.The current range of mitigation 1993 Implementing Agreement are summarized in Table 4-2.

Table 4-2: 1993 Implementing Agreement Mitigation Ratios, I-405 Kirkland Nickel Project

Impact Wetland **Category**[2]	**Type of Mitigation** Restoration and Creation[1]	
	Category II[2]	**Category III**[2]
I	4:1	6:1
II	2:1	3:1
III	1:1-1.5:1	1.5:1-2:1
IV	0.75:1-1.25:1	1:1-1.5:1

[1] *Appendix E of the 1993 Implementing Agreement (WDOT and Ecology, 1993)*

[?] *Hruby, 2004*

4.2.3 Local

Wetlands and associated buffers are regulated by the local jurisdiction. For the Kirkland Nickel Project, the local jurisdictions include the cities of Kirkland and Bothell, as well as King County. Project biologists rated the wetlands identified in the Kirkland Nickel study area based on the pertinent city or county code, which then determined wetland buffer widths and mitigation ratios. Wetland buffers are vegetated upland areas immediately adjacent to wetlands that protect the many functions and values of wetlands. Scientific

literature indicates that buffer widths are directly related to the degree of protection for a particular function.

Table B-2 in Appendix B lists the local jurisdiction, category, and buffer applied to each wetland in the Kirkland Nickel Project study area. The following sections extract wetland information contained in the sensitive areas ordinances of King County, Kirkland and Bothell. The full text of each code should be consulted during application of the regulations.

The sensitive areas portion of the King County Code is currently being updated by the county. Similarly, the City of Bothell is currently revising its environment code. The wetland ratings and assessment of wetlands provided in this report are based on the existing codes of the local jurisdiction valid in May 2004.

City of Kirkland

Chapter 90: Drainage Basins of the *City of Kirkland Zoning Code* (KZC) classifies wetlands into three types:

Type 1 wetlands meet any of the following conditions:

- Are contiguous to Lake Washington
- Contain at least one-quarter acre of organic soils, such as peat bogs or mucky soils
- Are equal to or greater than 10 acres in size and having three or more wetland classes, as defined by the USFWS (Cowardin et al., 1979), one of which is open water
- Have significant habitat value to state or federally listed threatened or endangered wildlife species
- Contain state or federally listed threatened or endangered plant species.

Type 2 wetlands fail to meet any of the criteria for Type 1 Wetlands, yet provide significant habitat function and value, and merit at least 22 points as determined by using the City's Wetland Field Data Form, which is Plate 26 of Chapter 180 KZC.

Type 3 wetlands fail meet the criteria for either Type 1 or Type 2 wetlands and merit fewer than 22 points as determined by using the City's Wetland Field Data Form, which is Plate 26 of Chapter 180 KZC.

According to the KZC 90.45, buffers from the wetland edge are required (see Table 4-3), and structures shall be set back a minimum of 10 feet from the designated or modified wetland buffer (90.45 [2]). Impacts to wetlands are to be mitigated according to the provisions under 90.55 Wetland Modification. Section 4D of that statute states that all approved impacts to regulated wetlands require compensatory mitigation in order to achieve the goal of no net loss of wetland function, value, and acreage. Mitigation shall be implemented through the creation of wetlands (from non-wetland areas) or through the restoration of wetlands (from uplands that were formerly wetlands). Mitigation ratios are also summarized in Table 4-3.

Table 4-3: City of Kirkland Wetland Regulations, I-405 Kirkland Nickel Project

	Buffer Requirement	Mitigation Ratio

Wetland Classification	Primary Basin	Secondary Basin	Primary Basin	Secondary Basin
Type 1	100 feet	75 feet	3:1	3:1
Type 2	75 feet	50 feet	2:1	1.5:1
Type 3	50 feet	25 feet	1.5:1	1:1

Source: City of Kirkland Zoning Code – Chapter 90

City of Bothell

The Bothell Municipal Code (BMC) Chapter 14 classifies wetlands into three types, as follows:

Category 1 wetlands meet any of the following criteria:

- Contain species listed by the federal government or the state of Washington as endangered, threatened, sensitive or priority, or the presence of essential or outstanding actual habitat for those species
- Have 40 to 60 percent permanent open water in dispersed patches with two or more classes of vegetation
- Are equal to or greater than 10 acres in size and having three or more wetland classes, one of which is open water
- Contain plant associations of infrequent occurrence.

Category 2 wetlands meet any of the following criteria:

- Are greater than one acre in size
- Are equal to or less than one acre in size and have three or more wetland classes
- Are equal to or less than one acre and has a forested wetland class
- Contain heron rookeries or raptor nesting trees.

Category 3 wetlands are equal to or less than one acre in size and have two or fewer wetland classes.

Bothell Municipal Code 14.04.200C defines wetland buffers as designated areas adjacent to and an integral part of a wetland ecosystem. Buffers ideally provide a transition between the natural wetland system and adjacent development or activity in order to protect a wetland from adverse impacts to its functions and values from said development or activity. All buffers are measured from the wetland edge as delineated in the field and are sized depending on the wetland category (see Table 4-3).

In accordance with BMC 14.04.150, any adverse effects from alterations to wetlands and their buffers shall be mitigated through restoration, creation, and/or enhancement. Mitigation actions shall result in no net loss of wetland area except when the lost wetland area provides minimal functions and the mitigation action(s) will clearly result in equal or greater wetland hydrologic and biologic functions, as determined by a site-specific function assessment. Such mitigation action(s) shall provide similar wetland functions to those lost, including those functions shown to be limiting within a watershed through a formal watershed assessment plan or protocol.

City of Bothell replacement ratios for restoration or creation of wetlands are summarized in Table 4-4. The ratios apply to restoration or creation that is in-kind, onsite, of the same category, timed prior to or concurrent with alteration, and has a high probability of success.

Table 4-4: City of Bothell Wetland Regulations, I-405 Kirkland Nickel Project

Wetland Classification	Buffer Requirement	Mitigation Ratio[1]
Category 1	100 feet	6:1
Category 2	75 feet	3:1
Category 3	50 feet	2:1

[1] *Mitigation ratios apply to restoration or creation that is in-kind, onsite, of the same category, timed prior to or concurrent with alteration, and has a high probability of success.*
Source: Bothell Municipal Code – Chapter 14 Environment

King County

- The King County Critical Areas Ordinance classifies wetlands into four categories (category I, category II, category III, and category IV) based on the *Washington State Wetland Rating System for Western Washington, Revised* (Hruby, 2004)

According to the King County critical areas ordinance, wetland buffers shall be established from the wetland edge as summarized in Table 4-5. Table 4-6 also summarizes the replacement or enhancement ratios for wetland impacts.

Table 4-5: King County Wetland Buffer Requirements, I-405 Kirkland Nickel Project

Type	Buffer
Category I	
Natural Heritage Wetlands	215 feet
Bog	215 feet
Estuarine	175 feet
Coastal Lagoon	175 feet
Habitat score from 29 to 36 points	225 feet
Habitat score from 20 to 28 points	150 feet
Category I wetlands not meeting any of the criteria below	125 feet
Category II	
Estuarine	135 feet
Habitat score from 29 to 36 points	200 feet
Ordinance 15051	
Habitat score from 20 to 28 points	125 feet
Category II wetlands not meeting any of the criteria below	100 feet
Category III	
Habitat score from 20 to 28 points	125 feet
Category III wetlands not meeting any of the criteria below	75 feet
Category IV	50 feet

Table 4-6: Typical King County Wetland Mitigation Ratios, I-405 Kirkland Nickel Project

Category and type of wetland	Wetland Reestablishment or Creation	Wetland Rehabilitation	Creation and	Enhancement	Wetland Enhancement Only
Category IV	1.5:1	3:1	1:1 R/C	2:1 E	6:1
Category III	2:1	4:1	1:1 R/C	2:1 E	8:1
Category II (non estuarine)	3:1	8:1	1:1 R/C	4:1 E	12:1
Category I (forested)	6:1	12:1	1:1 R/C	10:1	Case-by-case

4.3 Wetland Determinations

The following sections describe the wetlands identified in the study area. Figure 7 identifies wetland locations in the study area and Table B-1 in Appendix B of this document summarizes the characteristics of the identified wetlands. The wetland areas shown represent the total area of wetland delineated, not within the area of impact.

Thirty-three wetlands were delineated and 71 data plots were established within relatively Insert Figure 7

Figure 7 – sheet 2

Figure 7 – sheet 3

Figure 7 – sheet 4

Figure 7- sheet 5

Figure 7- sheet 6

Figure 7- Sheet 7

uniform areas of vegetation in wetland and upland areas. The majority of the wetland descriptions reflect late winter conditions observed when field investigations were conducted in mid-February and early March. Appendix C contains data forms corresponding to formal data plots, state and local wetland rating forms, and functional assessment forms.

Wetlands are described in location sequence from south to north. Each wetland identified in the field was assigned a number based on its MP location within the study area, starting with MP 15.9 at the south end of the study area and extending north to MP 23.4. The wetland number also includes an "L" if the wetland is located on the left (west) side of I-405 or an "R" if it is located on the right (east) side of I-405 (looking to the north). For example, a wetland found at the midpoint between MP 19 and MP 20 on the left side of I-405 would be Wetland 19.5L.

In the following sections, wetland descriptions are grouped into one of four drainage basins depending on wetland location: East Lake Washington (Yarrow Creek), Forbes Creek, Juanita Creek, and the Sammamish River.

4.3.1 East Lake Washington (Yarrow Creek)

Wetlands in the East Lake Washington (Yarrow Creek) drainage basin are generally located between the southern project boundary or NE 40th Street and the NE 85th Street interchange (MP 15.9 to 18.2). Within this section, transportation improvements are proposed for the southbound lanes only between MP 15.9 and 17. North of MP 17 transportation improvements are proposed for both northbound and southbound lanes.

Wetland 16.2R

Size and location: 0.847-acre wetland near the south end of the Kirkland city limits. The wetland is identified as "Yarrow 2" in *Kirkland's Streams, Wetlands, and Wildlife Study* (The Watershed Company, 1998). Portions of wetland 16.2R extend out of the project area to the north.

Vegetation: Dominated by black cottonwood, red alder, and salmonberry. Douglas-fir and big-leaf maple occur in adjacent upland area to the west and south.

Soils: a layer of black (10YR 2/1) silt loam extending to 12 inches, over a subsoil layer of olive brown (2.5Y 4/3) sand.

Hydrology: Soils are saturated to the surface in the soil pit, large areas of standing water elsewhere in the wetland.

Wetland Classification: Wetland 16.2R is a large PFO wetland that is semi-permanently flooded. It is a Category II wetland under Ecology's rating system and a Type 2 (75-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: This wetland provides the majority of functions evaluated under Null et al. (2000). Because it is depressional with a constricted oulet, it provides flood flow alteration, and nutrient and toxicant removal. It also provides wildlife habitat and native plant richness because it contains multiple vegetation classes and relatively few invasive species.

Wetland Determination: The boundary of Wetland 16.2R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation

and the presence of upland plant species such as Douglas-fir, beaked hazelnut, and sword fern.

Wetland 16.3L

Size and location: 0.03-acre wetland near the south end of the Kirkland city limits, adjacent to I-405 southbound road shoulder. The wetland area has been ditched and carries stormwater runoff from I-405.

Vegetation: Dominated by reed canarygrass. Douglas-fir, big-leaf maple, and vine maple occur in adjacent upland area.

Soils: A layer of very dark gray (2.5Y 3/1) gravel and sand fill extending to 12 inches, over a subsoil layer of olive brown (2.5Y 4/4) gravel and sand fill.

Hydrology: Free water present to the surface in the soil pit, areas of standing water elsewhere in the ditch.

Wetland Classification: Wetland 16.3L is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: Principal functions of Wetland 16.3L are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, and has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 16.3L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

Wetland 16.5L

Size and location: 0.064-acre wetland near the south end of the Kirkland city limits, adjacent to I-405 southbound road shoulder. The wetland is adjacent to a roadside ditch that carries stormwater runoff from I-405.

Vegetation: Dominated by reed canarygrass and bentgrass.

Soils: Surface layer of black (10YR 2/1) loamy sand extending to 5 inches deep, over a B horizon of dark grayish brown (2.5Y 4/2) sand with dark yellowish brown (10YR 4/4) mottles.

Hydrology: Soil pit inundated with one inch of water, standing water throughout the wetland.

Wetland Classification: Wetland 16.5L is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: Principal functions of Wetland 16.3L are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, and has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 16.5L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These

corresponded to the base of fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

Wetland 17.1R

Size and location: 0.02-acre wetland bordering I-405 near the NE 70th Street exit off-ramp, hydrologically connected to a ditch in the shoulder of the road. This wetland appears to have been intentionally constructed in an area that was historically upland for the purpose of stormwater detention.

Vegetation: Dominated by reed canarygrass and bentgrass, with a small number of black cottonwood saplings.

Soils: An A horizon that extends to 4 inches depth and is a very dark grayish brown (10YR 3/2) sandy loam. The B horizon extends from 4 inches to at least 16 inches deep and is a dark gray (5Y 4/1) loamy sand with gravels and olive brown (2.5Y 4/3) mottles.

Hydrology: Saturated soils at the surface with free water within one inch of the surface in the soil pit, discharges into a catchbasin at its northern boundary.

Wetland Classification: Wetland 17.1R is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: Principal functions of Wetland 17.1R are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405 and contains dense herbaceous vegetation.

Wetland Determination: The boundary of Wetland 17.1R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads. Adjacent uplands were distinguished from the wetland by topographical change, lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

Wetland 17.3R

Size and location: 0.048-acre wetland on the north side of the 72nd Street bridge, between I-405 and a noise wall, hydrologically connected to a ditch receiving water from upstream flow and road runoff. Water flows to a catchbasin at the northern end of the wetland.

Vegetation: Dominated by reed canarygrass and bentgrass with some soft rush and watercress.

Soils: A deep A horizon extending to at least 16 inches that is a very dark grayish brown (2.5Y 3/2) sand and gravel with strong brown (7.5YR 4/6) mottles.

Hydrology: Soils in the soil pit were saturated within 10 inches of the surface.

Wetland Classification: Wetland 17.3R is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: Principal functions of Wetland 17.3R are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405 and contains dense herbaceous vegetation.

Wetland Determination: The boundary of Wetland 17.3R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads. Adjacent uplands were distinguished from the wetland by topographical change, lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

Wetland 17.7R

Size and location: 0.096-acre wetland located south of both the pedestrian / bicycle overcrossing and the NE 85th Street exit between I-405 and a noise wall. Wetland is hydrologically connected to a ditch receiving water from road runoff and an incoming culvert. The water then flows into a catchbasin at the northern end of the wetland.

Vegetation: Dominated by bentgrass, reed canarygrass, and common cattail with some soft rush present.

Soils: An A horizon from the surface to 6 inches deep that is a very dark grayish brown (10YR 3/2) sandy loam. The B horizon extends from 6 inches to at least 16 inches deep and is a very dark gray (2.5Y 3/1) sandy gravelly loam with dark yellowish brown (10YR 4/6) mottles.

Hydrology: Saturated soils at the surface with free water in the soil pit within 8 inches of the surface.

Wetland Classification: Wetland 17.7R is a small PEM wetland that is semi-permanently saturated and seasonally flooded. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: Principal functions of Wetland 16.3L are sediment removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, seasonally contains ponded water, and has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 17.7R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation for a long period of time, and the presence of upland plant species.

Wetland 18.0R

Size and location: 0.101-acre wetland south of the NE 85th Street exit between I-405 and a noise wall. Wetland is hydrologically connected to a ditch and a seep receiving water from road runoff and hillside seeps.

Vegetation: Dominated by common velvetgrass and bentgrass with lesser amounts of other hydroseeded grasses.

Soils: an A horizon, extending from the surface to 2 inches depth, consisting of very dark grayish brown (10YR 3/2) silty sandy loam. The B horizon extends from 2 inches to 16 inches deep and is a dark grayish brown (2.5Y 4/2) gravelly sandy loam with yellowish brown (10YR 5/6) mottles.

Hydrology: Saturated soils at the surface and free water within 2 inches of the surface in the soil pit.

Wetland Classification: Wetland 18.0R is a small PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV wetland under Ecology's

rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal function of Wetland 18.0R is production of organic matter and its export. Wetland contains dense herbaceous vegetation, and has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 18.0R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads, topographic changes, and the boundary of groundwater seeps. Adjacent uplands were distinguished from the wetland by lack of hydrophytic vegetation or wetland hydrology, and the presence of upland plant species.

Wetland 18.05R

Size and location: 0.134-acre wetland in the southeast portion of the NE 85th Street interchange, bordered by northbound I-405 to the west and the northbound off-ramp to the east, and the cloverleaf to the north. Wetland is hydraulically connected to Wetland 18.1R to the north through a culvert beneath the on-ramp.

Vegetation: Dominated by bentgrass, soft rush, velvetgrass, black cottonwood, and paper birch.

Soils: An A horizon of greenish gray (Gley 1 5/5GY) gravel and sandy fill with dark yellowish brown (10YR 4/6) mottles.

Hydrology: Saturated soils at the surface and free water within 3 inches of the surface in the soil pit.

Wetland Classification: Wetland 18.05R is a small PFO wetland that is seasonally saturated/flooded. It is a Category IV wetland under Ecology's rating system and a Category III (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of Wetland 18.05R are flood flow alteration, sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff, is relatively flat, contains dense herbaceous and deciduous vegetation, and is seasonally inundated.

Wetland Determination: The boundary of Wetland 18.05R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by lack of wetland hydrology.

Wetland 18.06L

Size and location: 0.047-acre wetland in the southwest portion of the NE 85th Street interchange, primarily within a roadside ditch on a gentle north-facing slope. *Vegetation:* dominated by reed canarygrass, common cattail, and red alder.

Soils: Deep A horizon that extends to at least 16 inches depth and is a black (10YR 2/1) silt loam.

Hydrology: Soil saturation to the surface of the soil pit and free water at a depth of 3 inches in the soil pit, standing water throughout the northern portions of the wetland.

Wetland Classification: Wetland 18.06L is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: Principal functions of Wetland 18.06L are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, and discharges into a catchbasin.

Wetland Determination: The boundary of Wetland 18.06L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads. Adjacent uplands were distinguished from the wetland by topographical change, lack of soil saturation, or hydric soil indicators, and the presence of upland plant species.

Wetland 18.1R

Size and location: 1.309-acre wetland in the southeast portion of the NE 85th Street interchange, on a gentle north-facing slope. The central portions of the wetland are hydrologically connected with ditches.

Vegetation: Dominated by willow, red fescue, soft rush, paper birch, and bitter cherry.

Soils: Greenish gray (Gley 1 5/5GY) gravel and sand, with dark yellowish brown (10YR 4/6) mottles.

Hydrology: Soil saturation to the surface and free water within 6 inches of the surface in the soil pit.

Wetland Classification: Wetland 18.1R is a medium-sized PFO wetland that is semi-permanently flooded and occasionally inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal function of Wetland 18.1R is production and export of organic matter. The wetland contains deciduous trees, shrubs, and dense herbaceous plants and has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 18.1R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetlands by the lack of hydric soil indicators and the presence of upland plant species.

Wetland 18.15R

Size and location: 0.05-acre wetland in the northeast portion of the NE 85th Street interchange, a narrow swale near the center of the interchange cloverleaf.

Vegetation: Dominated by velvetgrass, soft rush, and bentgrass.

Soils: An A horizon to 6 inches deep consisting of dark grayish brown (2.5Y 4/2) sandy loam. A B horizon extends to at least 13 inches depth and is also a dark grayish brown (2.5YR 4/2) sandy loam but contains dark yellowish brown (10YR 4/4) mottles. Soils were extremely compacted below 13 inches.

Hydrology: Soil saturation at the surface and free water at a depth of 12 inches in the soil pit.

Wetland Classification: Wetland 18.15R is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: Principal functions of Wetland 18.15R are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff from I-405, contains dense herbaceous vegetation, and discharges into a catchbasin.

Wetland Determination: The boundary of Wetland 18.15R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads. Adjacent uplands were distinguished from the wetland by topographical change, lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

Wetland 18.2R

Size and location: 0.068-acre wetland east of the northbound I-405 ramp at the NE 85th Street interchange, in a narrow topographic depression near the WSDOT right-of-way fence.

Vegetation: Dominated by black cottonwood at the north end with red alder, Douglas spirea, and reed canarygrass occurring throughout the wetland.

Soils: An A horizon to 16 inches deep consisting of black (10YR 2/1) gravelly sandy loam.

Hydrology: Soils saturated to the surface, and free water was observed within 2 inches of the surface in the soil pit.

Wetland Classification: Wetland 18.2R is a small PFO wetland that is seasonally saturated and inundated. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of Wetland 18.2R are sediment removal and production and export of organic matter. The wetland has dense herbaceous vegetation and receives road and parking lot runoff. Additionally, the wetland contains deciduous trees and shrubs and has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 18.2R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

4.3.2 Forbes Creek

Wetlands in the Forbes Creek drainage basin are generally located between the NE 85th Street interchange and the NE 124th Street interchange (MP 18.2 to 19.9). Within this section, transportation improvements are proposed for both southbound and northbound lanes.

Wetland 18.3R

Size and location: 0.028-acre wetland northeast of the NE 85th Street interchange, near the northbound I-405 on-ramp, in a narrow topographic depression near the WSDOT right-of-way fence.

Vegetation: Dominated by black cottonwood, reed canarygrass, Douglas spirea, and red alder.

Soils: An A horizon of black (2.5Y 2.5/1) sandy loam extending to 5 inches depth over a B horizon of black (2.5Y 2.5/1) sand extending to at least 16 inches depth.

Hydrology: Saturated soils at the surface and free water within 4 inches of the surface in the soil pit.

Wetland Classification: Wetland 18.3R is a small PFO wetland that is seasonally saturated and inundated. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of Wetland 18.3R are sediment removal and production and export of organic matter. The wetland has dense herbaceous vegetation and receives road and parking lot runoff. Additionally, the wetland contains deciduous trees and shrubs and has a surface water connection to a stream.

Wetland determination: The boundary of Wetland 18.3R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators.

Wetland 18.4R

Size and location: 0.037-acre wetland in a shallow depression southeast of Forbes Lake, just south of a noise wall that borders the WSDOT right-of-way.

Vegetation: Dominated by bentgrass and black cottonwood saplings.

Soils: Very dark grayish brown (2.5Y 3/2) sandy gravelly loam, extending to below 16 inches depth. No hydric soil indicators. However, the area appears to be a human-induced wetland that receives runoff from I-405. Hydric soil characteristics would be expected to form in the future, assuming the current hydrological conditions persist.

Hydrology: No hydric soil indicators. However, the area appears to be a human-induced wetland that receives runoff from I-405. Hydric soil characteristics would be expected to form in the future, assuming the current hydrologic conditions persist. Soil was saturated at one inch deep and free water was observed at 10 inches depth in the soil pit. Areas of standing water were present elsewhere in the wetland.

Wetland Classification: Wetland 18.4R is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The chief functions of Wetland 18.4R are flood flow alteration and sediment removal. The wetland is a hydrologically isolated depression that receives runoff from I-405. Sediment deposits were observed in this wetland during field investigation.

Wetland Determination: The boundary of Wetland 18.4R was flagged where indicators of wetland vegetation and wetland hydrology were present. These corresponded to the base of fill for the adjacent road and topographical changes. Adjacent uplands were distinguished from the wetland by lack of soil saturation and the presence of upland plant species.

Wetland 19.27R

Size and location: 0.105-acre wetland south of the NE 116th Street exit, near the WSDOT right-of-way fence and extends downslope toward I-405 and along the road shoulder. Connects to a forested wetland outside of the WSDOT right-of-way to the west that is mapped in *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company,1998).

Vegetation: Dominated by reed canarygrass with some common cattail and soft rush present.

Soils: A horizon extends to 12 inches deep, very dark brown (10YR 2/2) sandy loam. The B horizon extends from 12 inches to at least 16 inches deep, dark grayish brown (10YR 4/2) gravelly sandy loam with dark yellowish brown (10YR 4/4) mottles.

Hydrology: Saturated soils at the surface and free water in the soil pit at 3 inches below the surface. Several areas of standing water were present. Hand auguring found water within 10 inches of the surface throughout the majority of the wetland.

Wetland Classification: Wetland 19.27R is a medium-sized PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of Wetland 19.27R are flood flow alteration, sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives runoff and floodwaters from adjacent development, contains dense vegetation, and is seasonally inundated. Additionally, the wetland has a surface connection to a stream.

Wetland Determination: The boundary of Wetland 19.27R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil indicators, and the presence of upland plant species.

Wetland 19.3R

Size and location: 0.248-acre south of the NE 116th Street interchange off-ramp, extending east outside of the WSDOT right-of-way and connecting to a forested wetland mapped in *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company, 1998).

Vegetation: Dominated by reed canarygrass, bentgrass, and small-fruited bulrush.

Soils: An A horizon extending to 15 inches depth that is a very dark grayish brown (10YR 3/2) sandy clay loam. Dark yellowish-brown (10YR 4/6) mottles are present between 6 and 15 inches deep. The B horizon extends from 15 inches to at least 18

inches depth and is a greenish-gray (GLEY 1 5/5GY) sandy clay loam with dark yellowish brown (10YR 4/6) mottles.

Hydrology: Saturated soils at the surface and free water present in the soil pit at 10 inches depth. Standing water in the wetland flows north, eventually becoming a channelized stream that discharges to a culvert extending west beneath I-405.

Wetland Classification: Wetland 19.3R is a medium-sized PFO wetland that is semi-permanently saturated and seasonally inundated. It is a Category III under Ecology's rating system and a Type 2 (75-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are sediment removal and production and export of organic matter. The wetland contains dense vegetation and receives runoff from nearby development. Additionally, the wetland has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 19.3R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland plant species.

Wetland 19.5L

Size and location: 0.574-acre south of the NE 116th Street interchange on-ramp, receives water from road runoff and hillside seeps. Water leaves the wetland through a ditch that extends along the west side of the wetland and into a culvert.

Vegetation: Dominated by reed canarygrass, soft rush, and bentgrass with some velvetgrass and western red cedar saplings.

Soils: An A horizon extending from the surface to 6 inches depth and consisting of a very dark gray (2.5Y 3/1) silt loam. B horizon extends from 6 inches to 10 inches deep and is a dark gray (2.5Y 4/1) sandy loam with dark yellowish brown (10YR 4/6) mottles. C horizon extends from 10 inches to at least 16 inches depth and is a dark gray (GLEY 1 4/N) sand.

Hydrology: Saturated soils at the surface and free water within 10 inches of the surface in the soil pit.

Wetland Classification: Wetland 19.5L is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and a culverted outlet.

Wetland Determination: The boundary of Wetland 19.5L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland plant species.

Wetland 19.6L

Size and location: 0.011-acre wetland immediately west of the southbound NE 116th Street on-ramp, within a ditch that receives road runoff and releases water into a catchbasin at the northern end of the wetland.

Vegetation: Dominated by reed canarygrass and bentgrass.

Soils: An A horizon extends from the surface to at least 16 inches depth that is a very dark gray (2.5Y 3/1) gravelly sandy loam with light olive brown (2.5Y 5/6) mottles.

*Hydrology: S*oils with 3 inches of water throughout much of the wetland.

Wetland Classification: Wetland 19.6L is a small PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are sediment removal and production and export of organic matter. The wetland receives road runoff and contains dense herbaceous vegetation.

Wetland Determination: The boundary of Wetland 19.6L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland plant species.

Wetland 19.6R

Size and location: 0.051-acre wetland on the east side of the northbound NE 116th Street interchange off-ramp, hydrologically connected to a ditch receiving water from road runoff, hillside seeps, and a culvert situated at the northeast end of the wetland. Drains to a catchbasin in the northern end of the wetland.

Vegetation: Dominated by reed canarygrass.

Soils: An A horizon extends from the surface to 6 inches depth and consists of very dark grayish brown (10YR 3/2) sandy loam. The B horizon extends from 6 inches to 11 inches deep, with very dark grayish brown (2.5Y 3/2) sandy loam and strong brown (7.5YR 4/6) mottles. The soil was compact at 11 inches and could not be investigated to any further depth.

Hydrology: Saturated soils within 8 inches of the surface and free water present within 10 inches of the surface in the soil pit.

Wetland Classification: Wetland 19.6R is a small PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are sediment removal and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 19.6R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These

corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators.

Wetland 19.7R

Size and location: 0.252-acre wetland on the east side of I-405, on the north side of NE 116th Street and extending outside the WSDOT right-of-way fence. Contains two topographically different wetland areas: to the south a constructed ditch is adjacent to NE 116th Street and to the north roadside runoff and hillside seeps contribute water to the wetland, which drains through a catchbasin at its southwest end.

Vegetation: South end is dominated by Himalayan blackberry, reed canarygrass, and bentgrass with lesser amounts of western red cedar and small-fruited bulrush. The northern hillside seep portion of wetland is dominated by reed canarygrass.

Soils: In the south portion, an A horizon extends from the surface to 6 inches deep, with very dark grayish brown (2.5Y 3/2) gravelly loam. The B horizon extends from 6 inches to 10 inches deep and consists of a dark grayish brown (2.5Y 3/2) loam with dark yellowish brown (10YR 4/6) mottles. Soils compacted below 10 inches depth. In the north portion, an A horizon was present from the surface to 3 inches deep, consisting of very dark gray (2.5Y 3/1) silt loam. The B horizon, extending from 3 inches to at least 14 inches depth, is a greenish gray (5/10Y) gravelly silt loam.

Hydrology: South end of wetland was inundated with 5 inches of water. The hillside seep portion was saturated to the surface and free water was present at 8 inches below the surface.

Wetland Classification: Wetland 19.7R is a PSS wetland that is semi-permanently saturated and seasonally inundated. It is a Category III under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are flood flow alteration, sediment removal and production, and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 19.7R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland vegetation, including Himalayan blackberry.

Wetland 19.8L

Size and location: 0.341-acre wetland, south of the NE 124th Street interchange, situated in the WSDOT right-of-way and extending past the right-of-way fence; receives water from road runoff as well as hillside seeps. The water leaves the wetland via a roadside ditch outside of the WSDOT right-of-way to the southwest. *Vegetation:* dominated by reed canarygrass with lesser amounts of Himalayan blackberry and bentgrass.

Soils: An A horizon, extending from the surface to at least 16 inches depth, consisting of a very dark grayish brown (10YR 3/2) loam with dark yellowish brown (10YR 4/6) mottles.

Hydrology: Saturated soils at the surface and free water were present at a one inch depth in the soil pit.

Wetland Classification: Wetland 19.8L is a PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal function of this wetland is production and export of organic matter. The wetland contains dense herbaceous vegetation and has an outlet from which organic matter is flushed.

Wetland Determination: The boundary of Wetland 19.8L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland vegetation including Douglas-fir.

4.3.3 Juanita Creek

Wetlands in the Juanita Creek drainage basin are generally located between the NE 124th Street interchange and the 116th Avenue NE interchange (from MP 19.9 to 22.5). Within this section, transportation improvements are proposed for the southbound lanes only.

Wetland 19.9L

Size and location: 0.443-acre wetland on the west side of I-405, between the southbound on-ramp of NE 124th Street and I-405, hydrologically connected to a ditch receiving water from road runoff and surface flow.

Vegetation: Southern portion is dominated by reed canarygrass and bentgrass with small amounts of evergreen blackberry; the forested northern portion is dominated by red alder with a small amount of willow present.

Soils: Southern portion contains an A horizon extending from the surface to at least 16 inches depth, with very dark grayish brown (10YR 3/2) sandy loam and strong brown (7.5YR 4/6) mottles. Northern portion contains an A horizon extending from the surface to 6 inches depth with very dark grayish brown (2.5Y 3/2) sandy loam and light olive brown (2.5Y 5/6) mottles. The B horizon extends from 6 inches to at least 16 inches deep and is a dark gray (5Y 4/1) loam with light olive brown (2.5Y 5/6) mottles.

Hydrology : In southern portion, saturated soils within 10 inches of the surface and free water within 16 inches of the surface, in northern portion, saturated soils to the surface and free water within 8 inches of the surface.

Wetland Classification: Wetland 19.9L is a PFO wetland that is semi-permanently saturated and seasonally inundated. It is a Category III under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and discharges into a catchbasin.

Wetland Determination: The boundary of Wetland 19.9L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland vegetation.

Wetland 19.9R

Size and location: 0.087-acre wetland located in the southeast quadrant of the 124th Street interchange, associated with a ditch that carries stormwater runoff from I-405.

Vegetation: Reed canarygrass, soft rush, and Himalayan blackberry with planted Douglas fir and big leaf maple adjacent upland area.

Soils: A layer of black (10YR 2/1) silt loam with gravels 16 inches, over a subsoil layer of dark gray (10YR 4/1) sandy loam.

Hydrology: Saturated soils at the surface with free water within 15 inches of the surface in the soil pit, discharges into a catchbasin at its northern boundary.

Wetland Classification: Wetland 19.9R is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are sediment removal, nutrient and toxicant removal, and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and a culverted outlet.

Wetland Determination: The boundary of Wetland 19.9R was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of wetland hydrology indicators and the presence of upland plant species.

Wetland 20.0L

Size and location: 0.080-acre wetland west of the NE 124th Street southbound on-ramp to I-405, includes a roadside ditch and extends upslope as a hillside seep.

Vegetation: Hillside seep area was recently cleared of vegetation including red alder saplings and Himalayan blackberry. Bare ground and tire ruts present through much of the wetland. Vegetation in the ditch portion of the wetland is dominated by reed canarygrass and soft rush.

Soils: The surface horizon of the soil to 11 inches deep is an olive gray (5Y 4/2) silty clay loam with olive brown (2.5Y 4/3) mottles. The lower soil horizon extends to at least 16 inches deep and is a dark greenish gray (Gley 1 4/10Y) silty clay with dark yellowish brown (10YR 4/4) mottles.

Hydrology: Saturation at the surface and free water at a depth of 14 inches in the soil pit, areas of standing water throughout.

Wetland Classification: Wetland 20.0L is a PEM wetland that is seasonally saturated/inundated. It is a Category IV under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are sediment removal, nutrient and toxicant removal, and production and export of organic matter.

The wetland receives road runoff, contains dense herbaceous vegetation, and discharges into a catchbasin.

Wetland Determination: The boundary of Wetland 20.L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads and topographical changes. Adjacent uplands were distinguished from the wetland by the lack of hydric soils, wetland hydrology indicators, and the presence of upland plant species.

Wetland 20.34L

Size and location: 0.279-acre PEM wetland northwest portion of the NE 124th Street interchange; consists of two wetland areas connected by an east-to-west swale near the center of the cloverleaf. The western portion is a previously excavated depression that provides stormwater detention, while the eastern portion is generally flat with some landscaped trees and shrubs. This wetland was previously delineated by Herrera Environmental, Inc., and identified as "Wetland D" and "Wetland E" (USDOT et al., 2002).

Vegetation: Western portion dominated by common cattail, soft rush, and red alder; eastern end dominated by reed canarygrass, soft rush, and common reed. The swale connecting each portion is dominated by bentgrass and water foxtail.

Soils: Western portion has a deep gleyed layer that is a greenish gray (GLEY 2 5/5 BG) sandy clay loam with cobbles; horizon extends to at least 16 inches deep and contains many distinct dark yellowish brown (10YR 4/6) mottles. This area contained one to 12 inches of standing water. The soil in the eastern portion has an A horizon that extends to at least 16 inches deep and is a dark grayish brown (10YR 4/2) sandy loam with dark yellowish brown (10YR 4/6) mottles. Soils in the swale were similar to those found in the eastern portion of the wetland.

Hydrology: Western portion contained 1 to 12 inches of standing water. The eastern portion contained two inches of standing water, and standing water was present throughout the swale.

Wetland Classification: Wetland 20.34L is a PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category III wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are flood flow alteration, nutrient and toxicant removal, and general habitat suitability. The wetland receives road runoff, contains dense herbaceous vegetation and a deep depression, and is located near a large PSS/PEM wetland.

Wetland Determination: The boundary of Wetland 20.34L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation and the presence of upland plant species.

Wetland 20.35L

Size and location: 0.165-acre wetland northwest portion of the NE 124th Street interchange. This wetland is identified in *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company, 1998) and was previously delineated by Herrera Environmental, Inc., and identified as "Wetland C" (USDOT et al., 2002).

Vegetation: Dominated by bentgrass, reed canarygrass, and Pacific willow.

Soils: A layer of very dark grayish brown (2.5Y 3/2) sandy loam extending to 5 inches depth, over a subsoil layer of dark gray (10YR 4/1) sandy clay loam with dark yellowish brown (10YR 4/6) mottles.

Hydrology: Soil saturated to the surface and free water within 10 inches of the surface, with areas of standing water in several portions of the wetland.

Wetland Classification: Wetland 20.35L is a small PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV wetland under Ecology's rating system and a Type 3 (50-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this wetland are sediment removal and production and export of organic matter. The wetland receives road runoff, contains dense herbaceous vegetation, and has a surface water connection to a stream.

Wetland Determination: The boundary of Wetland 20.35L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation and the presence of upland plant species.

Wetland 20.4L

Size and location: 2.759-acre wetland near the NE 124th Street interchange. This wetland is identified on NWI maps and is part of a 25-acre PEM/PSS/PFO wetland identified as "Juanita 4" in *Kirkland's Streams, Wetlands and Wildlife Study* (The Watershed Company, 1998). This wetland contains a tributary of Juanita Creek and provides wildlife habitat. It is surrounded by development and contains little or no upland buffer. Wetland 20.4L was previously delineated by Herrera Environmental, Inc., and identified as "Wetland B" (USDOT et al., 2002).

Vegetation: Dominated by reed canarygrass, Pacific willow, common cattail, and black cottonwood.

Soils: An A horizon that extends to 5 inches deep and is a very dark grayish brown (10YR 3/2) muck. The B horizon extends to at least 16 inches deep and is a dark grayish brown (2.5Y 4/2) gravelly sandy loam with yellowish brown (10YR 5/6) mottles.

Hydrology: Saturated soils and inundated to the surface of the soil pit, with areas of standing water throughout the majority of the wetland.

Wetland Classification: Wetland 20.4L is a large PSS wetland that is semi-permanently inundated. It is a Category II wetland under Ecology's rating system and a Type 2 (75-foot buffer) under the City of Kirkland's sensitive areas regulations.

Wetland Functional Assessment: This wetland provides the majority of functions evaluated under Null et al. (2000). It is part of a large wetland complex with several Cowardin classes, which can store large volumes of water for a long period of time. The wetland is suitable habitat for a variety of wetland-associated animal species.

Wetland Determination: The boundary of wetland 20.4L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of fill for adjacent roads and development, and

topographical changes. Adjacent uplands were distinguished from the wetland by the lack of saturated soil or hydric soil.

Wetland 21.6L

Size and location: 0.093-acre wetland in the I-405 median, north of Kirkland city limits in unincorporated King County and hydrologically connected to a small stream that flows through a pipe beneath the northbound lanes of I-405.

Vegetation: dominated by small-fruited bulrush, red alder, Himalayan blackberry, and giant horsetail.

Soils: an A horizon of very dark brown (10YR 2/2) sandy silt loam extending to 11 inches deep, over a B horizon of very dark greenish gray (Gley 1 3/10Y) sand with dark yellowish brown (10YR 3/6) mottles.

Hydrology: Saturated soils at the surface in the soil pit, with water flowing into the soil pit at a depth of 2 inches.

Wetland Classification: Wetland 21.6L is a small PFO wetland that is semi-permanently saturated. It is a Category IV wetland under Ecology's rating system and a Category IV (50-foot buffer) under the King County's sensitive areas regulations.

Wetland Functional Assessment: Principal functions of the wetland are erosion control and production and export of organic matter. The stream flowing through the wetland is bordered with deciduous trees and shrubs, and herbaceous vegetation.

Wetland Determination: The boundary of Wetland 21.6L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by lack of soil saturation or hydric soil, and the presence of upland plant species.

Wetland 21.7L

Size and location: 0.242-acre wetland situated in the I-405 median, north of Kirkland city limits in unincorporated King County.

Vegetation: Dominated by Himalayan blackberry and big leaf maple with some skunk cabbage present in areas of standing water throughout the wetland.

Soils: An A horizon composed of a black (7.5YR 2.5/1) silt loam extending to 13 inches deep, over a B horizon of very dark greenish gray (Gley 1 3/5GY) sandy clay loam.

Hydrology: Soil was saturated to the surface in the soil pit, with water seeping in at a depth of 7 inches, with areas of standing water in several portions of the wetland.

Wetland Classification: Wetland 21.7L is a moderately sized PFO wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV wetland under Ecology's rating system and a Category IV (50-foot buffer) under the King County's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of the wetland are flood flow alteration, sediment removal, and nutrient and toxicant removal. The wetland is relatively flat and receives road runoff for I-405. Seasonal ponding occurs in wetland.

Wetland Determination: The boundary of Wetland 21.7L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These

corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of hydric soil and soil saturation, and the presence of upland plant species.

Wetland 21.8L

Size and location: 0.054-acre wetland situated in t he I-405 median, located north of Kirkland city limits in unincorporated King County. Wetland is a narrow ditch flowing south, adjacent to I-405.

Vegetation: Dominated by velvet grass, bent grass, and soft rush.

Soils: a layer of very dark grayish brown (10YR 3/2) gravelly sandy loam extending to 2 inches, over a subsoil layer of dark gray (5Y 4/1) sandy with dark yellowish browh (10YR 4/6) mottles.

Hydrology: Soil saturated to surface and free water present at 10-inch depth in soil pit.

Wetland Classification: Wetland 21.8L is a small PEM wetland that is semi-permanently saturated and seasonally inundated. It is a Category IV wetland under Ecology's rating system and a Category IV (50-foot buffer) under the King County's sensitive areas regulations.

Wetland Functional Assessment: The principal function of Wetland 21.8L is sediment removal. The wetland contains dense herbaceous vegetation, and receives road runoff from I-405.

Wetland Determination: The boundary of Wetland 21.8L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil.

4.3.4 Sammamish River

Wetlands in the Sammamish River drainage basin are generally located between the 116th Avenue NE interchange and the northern project boundary (from MP 22.5 to 23.4). Within this section, transportation improvements are proposed for the southbound lanes only.

Wetland 22.5L

Size and location: 4.09-acre wetland south of the Brickyard Park-and-Ride lot. Only 0.025 acres of this large forested wetland is located within the study area. Wetland 22.5L was previously delineated by Parametrix, Inc., and identified as "Wetland D" (Parametrix, 2002).

Vegetation: Dominated by red alder, Himalayan blackberry, and willow.

Soils: An A horizon extending to at least 18 inches deep with black (10YR 2/1) loamy sand with high organic content. The lower 12 to 18 inches contains riprap rocks that have been buried by sediment and organic matter.

Hydrology: Saturation to the surface and free water in the soil pit at a depth of four inches, with standing water in several portions of the wetland and channelized flow.

Wetland Classification: Wetland 22.5L is a PFO wetland that is semi-permanently saturated and seasonally inundated. It is a Category III wetland under Ecology's rating system and a Category III (75-foot buffer) under the King County's sensitive areas regulations.

Wetland Functional Assessment: The principal functions of this Wetland 22.5L are flood flow alteration and general habitat suitability. The wetland receives road runoff, contains a forested community, and is associated with a stream.

Wetland Determination: The boundary of Wetland 22.5L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation and the presence of upland plant species.

Wetland 22.8L

Size and location: 1.156-acre wetland located north of the NE 160th Street interchange hydrologically connected by a small tributary to the Sammamish River.

Vegetation: Dominated by reed canarygrass in an emergent area, and Pacific willow, salmonberry, and black cottonwood in the scrub-shrub and forested areas.

Soils: Very dark gray (10YR 3/1) sandy loam extending to below 16 inches depth.

Hydrology: Saturated soils at the surface and free water within 2 inches of the surface in the soil pit; low to moderate flow in stream and areas of standing water.

Wetland Classification: Wetland 22.8L is a moderate-sized PFO wetland that is semi-permanently inundated. It is a Category III wetland under Ecology's rating system and a Type 2 (75-foot buffer) under the City of Bothell's sensitive areas regulations.

Wetland Functional Assessment: Principal functions the wetland are sediment removal, flood flow alteration, nutrient and toxicant removal, and production and export of organic matter. Wetland 22.8L receives road and development runoff, can retain fairly high volumes of water, and contains dense herbaceous plants and deciduous trees and shrubs.

Wetland Determination: The boundary of Wetland 22.8L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of soil saturation or hydric soil, and the presence of upland plant species.

Wetland 23.2L-DT

Size and location: 0.307-acre wetland located south of East Riverside Drive on the Parcell Property. The wetland borders a small tributary to the Sammamish River.

Vegetation: Dominant plants in the wetland include red alder, salmonberry, pacific willow, skunk cabbage, reed canarygrass, and lady fern.

Soils: an "A1" horizon of very dark grayish brown (10YR 3/2) silt loam extending to 8 inches over an "A2" horizon of very dark grayish brown (10YR 3/2) silt loam with dark

yellowish brown (10 YR 3/6) mottles. A “B” horizon occurring from 13 to 17 inches consists of dark olive gray (5Y 3/2) sandy with dark olive brown (2.5Y 3/3) mottles.

Hydrology: Saturated soil at a depth of 6 inches in the test pit. Areas of seasonal inundation were observed with the wetland.

Wetland Classification: Wetland 23.2L is a small PFO wetland that is semi-permanently flooded. It is a Category III wetland under Ecology’s rating system and a Type 2 (75-foot buffer) under the City of Bothell’s sensitive areas regulations.

Wetland Functional Assessment: This wetland provides the majority of functions evaluated under Null et al. (2000). The wetland contains ponded water, receives runoff from nearby development, and contains deciduous trees and shrubs.

Wetland Determination: The boundary of Wetland 23.2L was flagged where indicators of wetland vegetation, hydric soil, and wetland hydrology were present. These corresponded primarily to the base of the fill for adjacent roads or topographical changes. Adjacent uplands were distinguished from the wetland by the lack of hydric soil and soil saturation, and the presence of upland plant species.

5.0 Impacts

5.1 Build Alternative

The Kirkland Nickel Project will affect wetlands, both temporarily and permanently.

5.1.1 Impacts During Construction

Temporary

Temporary impacts produce short-term loss of wetland functions during construction and for up to five years following construction. They do not, however, result in a permanent loss of wetlands after the project is completed and once disturbed vegetation or wetland hydrology is reestablished. Approximately 0.191 acres of wetlands would be temporarily disturbed during construction activities, including vegetation clearing and the placement of fill material.

Erosion and sedimentation caused by construction activities would temporarily affect additional areas. Although not as direct a modification as clearing and filling, the sediment can settle within a wetland and reduce the quality of habitat available for invertebrate life and habitat for plants, as well as reduce the potential water quality and quantity benefits provided by those wetlands. Implementing BMPs, as required in the *WSDOT Highway Runoff Manual* (WSDOT, 2004b), will minimize this erosion and sedimentation.

The extent of short-term degradation would vary depending on the intensity of the temporary impact. Wetlands where the vegetation is cleared or trimmed would still retain some water quality and quantity function, although at a diminished level. Filled wetlands would provide no beneficial functions until they were restored. Wetlands temporarily impacted during construction would be restored to their pre-existing conditions following the completion of work and it is anticipated that they would return to a functioning state within five years.

Permanent

Fourteen wetlands, totaling 1.599 acres, of the 33 wetlands identified in the Kirkland Nickel Project, will be permanently impacted as a result of filling, as listed in Table 5-1. Permanent impacts represent an impact on those beneficial functions provided by the individual wetland as noted in Table B-3.

In order to lay the foundation for the transportation project, permanent impacts would result from WSDOT filling the wetland to construct new facilities; diverting or re-directing surface runoff that would be necessary to support wetland hydrology; or filling such a high percentage of the area of a wetland that the remaining area would not function at pre-construction levels.

Indirect

In addition, the project will result in approximately 0.018 acre of indirect impacts to wetlands. Indirect wetland impacts would occur where most of the existing wetland area would be permanently filled such that the remainder was not likely to function at the same level as occurred prior to construction.

Impact Summary

Specific design changes were made to avoid or minimize impacts to wetlands and their buffers. Avoidance and minimization measures are identified in Table 5-1. Not all impacts could be avoided because of the location of wetlands in proximity to the road and the need to adhere to required design standards. The Kirkland Nickel Project will require filling or temporarily disturbing an estimated 1.808 acres of wetland. This represents approximately 18 percent of the wetlands identified within the study area. Of this total, approximately 0.191 acres would be temporarily disturbed during construction, 1.599 acres would be directly filled and subsequently restored, and 0.018 acres of wetland would be indirectly impacted.

The quantity of wetland fill within each basin will generally be consistent with the percentage of wetlands within that basin. Thus, the Forbes Creek basin will have the largest total of fill (1.211 acres or 73.5 percent of the total affected area).

Table 5-1: Filled or Disturbed Wetlands, I-405 Kirkland Nickel Project

Wetland Identifier	Area (acres)	Permanent Filled or Otherwise Disturbed Area (acres)	Temporary Filled or Otherwise Disturbed Area (acres)	Local Jurisdiction and Rating	Wetland Category	Avoidance and Minimization
16.2R	0.847	0.000	0.000	Kirkland - 2	II	Moved detention pond to avoid impacts.
16.3L	0.031	0.031	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards.
16.5L	0.064	0.064	0.000	Kirkland – 3	IV	Unavoidable due to roadway design standards.
17.1R	0.021	0.000	0.000	Kirkland – 3	IV	Direct impacts avoided. Temporary impacts to buffer unavoidable during construction.
17.3R	0.048	0.000	0.000	Kirkland - 3	IV	Avoided
17.7R	0.096	0.000	0.000	Kirkland - 3	IV	Avoided
18.05R	0.134	0.000	0.000	Kirkland - 3	IV	Avoided
18.06L	0.047	0.000	0.000	Kirkland - 3	IV	Avoided
18.0R	0.102	0.000	0.000	Kirkland - 3	IV	Avoided
18.15R	0.05	0.000	0.000	Kirkland - 3	IV	Avoided
18.1R	1.309	0.000	0.000	Kirkland - 3	IV	Avoided
18.2R	0.068	0.000	0.000	Kirkland - 3	IV	Avoided
18.3R	0.028	0.000	0.000	Kirkland - 3	IV	Avoided
18.4R	0.037	0.037	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards.
19.27R	0.105	0.078	0.023	Kirkland - 3	IV	Unavoidable due to roadway design standards.
19.3R	0.249	0.248	0.000	Kirkland – 2	III	Unavoidable due to roadway design standards.
19.5L	0.574	0.574	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards. Retaining wall added to limit impacts.
19.6L	0.011	0.011	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards.
19.6R	0.051	0.051	0.000	Kirkland - 3	IV	Unavoidable due to roadway design standards.

Wetland Identifier	Area (acres)	Permanent Filled or Otherwise Disturbed Area (acres)	Temporary Filled or Otherwise Disturbed Area (acres)	Local Jurisdiction and Rating	Wetland Category	Avoidance and Minimization
19.7R	0.252	0.064	0.028	Kirkland - 3	III	Unavoidable due to roadway design standards.
19.8L	0.341	0.000	0.000	Kirkland - 3	IV	Direct impacts avoided. Temporary impacts to buffer unavoidable during construction.
19.9L	0.443	0.000	0.000	Kirkland - 3	III	Avoided
19.9R	0.088	0.069	0.018	Kirkland - 3	IV	Unavoidable due to drainage requirements.
20.0L	0.08	0.000	0.000	Kirkland – 3	IV	Avoided
20.34L	0.279	0.000	0.000	Kirkland – 3	III	Avoided
20.35L	0.165	0.000	0.000	Kirkland – 3	IV	Direct impacts avoided. Temporary impacts to buffer unavoidable during construction.
20.4L	2.759	0.000	0.000	Kirkland - 2	II	Avoided
21.6L	0.093	0.042	0.011	King County - 4	IV	Unavoidable due to existing noise mitigation facilities. Footprint adjusted to minimize impacts.
21.7L	0.242	0.138	0.031	King County - 4	IV	Unavoidable due to existing noise mitigation facilities. Footprint adjusted to minimize impacts.
21.8L	0.054	0.054	0.000	King County - 4	IV	Unavoidable due to existing noise mitigation facilities. Footprint adjusted to minimize impacts.
22.5L	0.025	0.000	0.000	King County - 3	III	Direct impacts avoided. Retaining wall added to limit impacts to buffer.
22.8L	1.156	0.136	0.099	Bothell - 3	III	Unavoidable due to roadway design standards. Retaining wall added to limit impacts.
23.2L	0.307	0.000	0.000	Bothell - 2	III	Direct impacts avoided. Footprint adjusted to avoid impacts.
TOTAL	**10.156**	**1.599**	**0.207**			

The East Lake Washington basin will have the smallest amount of fill (0.095 acres or 3.4 percent of the total wetland area). Although the Juanita Creek basin contains the largest acreage of wetlands (4.202 acres), only 0.363 acres, or 8.6 percent of the total will be filled. An estimated 0.235 acres of the Sammamish River basin would be filled, affecting 15.8 percent of that basin's wetlands in the study area.

The wetlands within the study area primarily improve water quality and abate stormwater flows (see Table B-3 in Appendix B). Therefore, the temporary and permanent impacts to wetlands in the study area would primarily result in a loss of stormwater management functions throughout the project vicinity. Specifically, wetland loss would reduce flood water desynchronization, sediment removal, nutrient and toxicant removal, and erosion control. Overall, the wetlands within the study area are lower valued wetlands related to

habitat functions because of their proximity to, and association with, I-405; however, the project would also result in a loss of general wildlife habitat and fish habitat within the project vicinity.

5.1.2 Impacts During Operation

No additional effects on wetlands are expected during operation of the Build Alternative. Some wetlands located within the right-of-way are currently affected by vegetation and stormwater conveyance system maintenance activities. Wetland areas that would not be lost as a result of construction and that occur within the right-of-way would likely continue to be affected by these activities.

5.1.3 Indirect Impacts

No indirect impacts to wetlands are expected with the Build Alternative.

5.2 No Build Alternative

5.2.1 Impacts During Construction

No wetlands would be filled by construction of the No Build Alternative. Only routine maintenance and minor safety improvements would take place.

5.2.2 Impacts During Operation

No wetlands would be filled by the operation of the No Build Alternative. Wetlands within the right-of-way are currently affected by vegetation and stormwater conveyance system maintenance and would likely continue to be affected by these activities.

5.2.3 Indirect Impacts

Wetlands in the Kirkland Nickel Project study area currently receive untreated runoff from storm facilities not at current treatment levels. Water quality in these wetlands would continue to be affected by sediment transport and erosion.

6.0 Mitigation

WSDOT will follow the "Project Activities to Avoid Environmental Impacts" and will comply with all applicable environmental procedures, rules, and regulations discussed in the description of the Build Alternative. WSDOT will mitigate for impacts to ensure "no net loss" of wetlands as require by WSDOT policies that follow the State of Washington Executive Order 89-10, Protection of Wetlands. The *Kirkland Nickel Draft Wetland Mitigation Plan* (WSDOT, 2005) discusses the mitigation sites that have been selected for compensatory mitigation and details the mitigation approach for each site.

7.0 Unavoidable Adverse Impacts

No unavoidable adverse impacts are anticipated assuming that the project activities to avoid or minimize effects to the environment are implemented.

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Appendix A:

Common and Taxonomic Plant Names

Table A-1: Plant Species List for the I-405 Kirkland Nickel Wetlands Study

Common Name	Scientific Name	WIS1
TREES		
big-leaf maple	*Acer macrophyllum*	FACU
bitter cherry	*Prunus emarginata*	FACU*
black cottonwood	*Populus balsamifera*	FAC
cascara	*Rhamnus purshiana*	FAC-
Douglas-fir	*Pseudotsuga menziesii*	FACU*
mountain ash	*Sorbus aucuparia*	NL
one-fruited hawthorn	*Crataegus monogyna*	ORN
Oregon ash	*Fraxinus latifolia*	FACW
Pacific crabapple	*Malus fusca*	FACW
Pacific madrona	*Arbutus menzeisii*	NL
paper birch	*Betula papyrifera*	FAC*
quaking aspen	*Populus tremula*	FAC
red alder	*Alnus rubra*	FAC
Sitka spruce	*Picea sitchensis*	FAC
western hemlock	*Tsuga heterophylla*	FACU-
western red cedar	*Thuja plicata*	FAC
SHRUBS		
beaked hazelnut	*Corylus cornuta*	FACU
black hawthorn	*Crataegus douglassi*	FAC
black raspberry	*Rubus leucodermis*	NL
black twin-berry	*Lonicera involucrate*	FAC+*
clustered rose	*Rosa pisocarpa*	FAC
currant	*Ribes spp.*	FAC-FAC+
devil's club	*Oplopanax horridus*	FAC+
Douglas' spiraea	*Spiraea douglasii*	FACW
English holly	*Ilex aquifolium*	NL
English ivy	*Hedera helix*	NL
evergreen blackberry	*Rubus laciniatus*	FACU
Himalayan blackberry	*Rubus discolor*	FACU
honeysuckle	*Lonicera spp.*	FACU-FAC
Hooker's willow	*Salix hookeriana*	FACW-
huckleberry	*Vaccinium spp.*	NL-OBL
Indian plum	*Oemleria cerasiformis*	FACU
long-leaved Oregon grape	*Berberis nervosa*	NL

Common Name	Scientific Name	WIS1
Nootka rose	*Rosa nutkana*	FAC
ocean spray	*Holodiscus discolor*	NL
Pacific blackberry	*Rubus ursinus*	FACU
Pacific ninebark	*Physocarpus capitatus*	FACW-
Pacific willow	*Salix lasiandra*	FACW+
red elderberry	*Sambucus racemosa*	FACU
red huckleberry	*Vaccinium parvifolium*	NL
red-osier dogwood	*Cornus stolonifera*	FACW
salal	*Gaultheria shallon*	FACU*
salmonberry	*Rubus spectabilis*	FAC+
scotchbroom	*Cytisus scoparius*	NL
Scouler's willow	*Salix scouleriana*	FAC
Sitka willow	*Salix sitchensis*	FACW
snowberry	*Symphoricarpos albus*	FACU
swamp laurel	*Kalmia occidentalis*	FACW+
tall Oregon grape	*Berberis aquifolium*	NL
thimbleberry	*Rubus parviflorus*	FAC-
vine maple	*Acer circinatum*	FAC-
western snowberry	*Symphoricarpos occidentalis*	NI
white willow	*Salix alba*	FACW
HERBS		
American brooklime	*Veronica americana*	OBL
American vetch	*Vicia americana*	NI
American waterlily	*Nymphaea odorata*	OBL
aster	*Aster spp.*	NL-OBL
bedstraw	*Galium spp.*	UPL-FACW+
birdsfoot-trefoil	*Lotus corniculatus*	FAC
bitter nightshade	*Solanum dulcamara*	FAC+
bracken fern	*Pteridium aquilinum*	FACU
bull thistle	*Cirsium vulgare*	FACU
buttercup	*Ranunculus spp..*	NL-OBL
Canadian goldenrod	*Solidago canadensis*	FACU
Canadian thistle	*Cirsium arvense*	FACU+
catchweed bedstraw	*Galium aparine*	FACU
coltsfoot	*Petasites spp.*	FAC-FACW
common cat-tail	*Typha latifolia*	OBL

Common Name	Scientific Name	WIS1
common groundsel	*Senecio jacobaea*	FACU
common plantain	*Plantago major*	FACU+
common shepards' purse	*Capsella bursa-pastoris*	FACU
common speedwell	*Veronica officinalis*	NL
common St. John's wort	*Hypericum perforatum*	NL
common tansy	*Tanacetum vulgare*	NI
common vetch	*Vicia sativa*	NL
common yarrow	*Achillea millefolium*	FACU
Cooley's hedge-nettle	*Stachys cooleyae*	NL
cow parsnip	*Heracleum lanatum*	FAC+
creeping buttercup	*Ranunculus repens*	FACW
cress	*Rorippa spp.*	FAC+-OBL
curly dock	*Rumex crispus*	FAC+
dandelion	*Taraxacum officinale*	FACU
deer fern	*Blechnum spicant*	FAC+
dock	*Rumex spp.*	FAC-.OBL
duckweed	*Lemna minor*	OBL
English ivy	*Hedera helix*	NL
English plantain	*Plantago lanceolata*	FAC
false lily-of-the-valley	*Maianthemum dilatatum*	FAC
field horsetail	*Equisetum arvense*	FAC
fireweed	*Epilobium angustifolium*	FACU+
foamflower	*Tiarella trifoliata*	FAC-
forget-me-not	*Myosotis spp.*	FAC-FACW
foxglove	*Digitalis purpurea*	FACU*
giant horsetail	*Equisetum telmateia*	FACW
hairy cats-ear	*Hypochaeris radicata*	NL
horsetail	*Equisetum spp.*	FAC-OBL
Japanese knotweed	*Polygonum cuspidatum*	FACU*
lady fern	*Athyrium filix-femina*	FAC
large-leaf avens	*Geum macrophyllum*	FACW-*
licorice fern	*Polypodium glycyrrhiza*	NL
mint	*Mentha spp.*	FAC-OBL
mustard	*Brassica campestris*	NL
oxeye-daisy	*Chrysanthemum leucanthemum*	NL
Pacific bedstraw	*Galium cymosum*	FACW
Pacific bleedingheart	*Dicentra formosa*	FACU*

Common Name	Scientific Name	WIS1
Pacific silverweed	*Potentilla anserina*	OBL
pearly everlasting	*Anaphalis margaritacea*	NL
pig-a-back-plant	*Tolmiea menziesii*	FAC*
pineapple weed	*Matricaria matricarioides*	FACU
pondweed	*Potamogeton spp.*	OBL
purple loosestrife	*Lythrum salicaria*	FACW+
red clover	*Trifolium pratense*	FACU
scouring horsetail	*Equisetum hyemale*	FACW
sheep sorrel	*Rumex acetosella*	FACU+
skunk cabbage	*Lysichitum americanum*	OBL
smartweed	*Polygonum spp.*	FACU-OBL
speedwell	*Veronica spp.*	NL-OBL
sphagnum moss	*Sphagnum spp.*	NL
spreading bentgrass	*Agrostis stolonifera*	FAC+
stinging nettle	*Urtica dioica*	FAC+
strawberry	*Fragaria virginiana*	NL
sweet coltsfoot	*Petasites frigidus*	FACW-
sword fern	*Polystichum munitum*	FACU
thistle	*Cirsium spp.*	FACU-OBL
vetch	*Vicia spp.*	NI-NL
water cress	*Rorippa nastursium-aquatica*	NL
water parsley	*Oenanthe sarmentosaa*	OBL
water starwort	*Callitriche spp.*	OBL
Watson's willow-weed	*Epilobium watsonii*	FACW-
western St. John's wort	*Hypericum formosum*	FAC-
white clover	*Trifolium repens*	FAC*
GRASSES, RUSHES, AND SEDGES		
bluegrass	*Poa spp.*	NL-FACW
bulrush	*Scirpus spp.*	OBL
colonial bentgrass	*Agrostis tenuis*	FAC
common spike-rush	*Eleocharis palustris*	OBL
common timothy	*Phleum pratense*	FAC-
common velvetgrass	*Holcus lanatus*	FAC
creeping velvetgrass	*Holcus mollis*	FACU*
Dewey's sedge	*Carex deweyana*	FACU*
fowl bluegrass	*Poa palustris*	FAC

Common Name	Scientific Name	WIS1
hardstem bulrush	*Scirpus acutus*	OBL
Kentucky bluegrass	*Poa pratensis*	FAC
mannagrass	*Glyceria spp.*	FACW+-OBL
meadow foxtail	*Alopecurus pratensis*	FACW
orchard-grass	*Dactylis glomerata*	FACU
perennial ryegrass	*Lolium perenne*	FACU
quackgrass	*Agropyron repens*	FAC-
red fescue	*Festuca rubra*	FAC+
reed canarygrass	*Phalaris arundinacea*	FACW
rush	*Juncus spp.*	FAC-OBL
sedge	*Carex spp.*	FAC-OBL
slough sedge	*Carex obnupta*	OBL
small- fruited bulrush	*Scirpus microcarpus*	OBL
soft rush	*Juncus effusus*	FACW
spike-rush	*Eleocharis spp.*	FACW-OBL
spreading bentgrass	*Agrostis stolonifera*	FAC+
tall fescue	*Festuca arundinacea*	FAC-
tall mannagrass	*Glyceria elata*	FACW+
wheatgrass	*Agropyron spp.*	FACU-FAC

[1] WIS (Wetland Indicator Status)

OBL (Obligate): species almost always occur wetlands under natural conditions (est. probability >99%).

FACW (Facultative wetland): species usually occur in wetlands (est. probability 67 to 99%), but are occasionally found in non-wetlands.

FAC (Facultative): Species equally likely to occur in wetlands or non-wetlands (est. probability 34 to 66%).

FACU (Facultative upland): species usually occur in non-wetlands (est. probability 67 to 99%), but are occasionally found in wetlands.

UPL (Upland): species almost always occurring in non-wetlands under normal conditions (est. probability >99%).

NL (Not listed): species not listed and presumed to be upland species.

+ indicates a species more frequently found in wetlands

- indicates a species less frequently found in wetlands

** identifies a tentative assignment based on either limited information or conflicting reviews*

Appendix B:

Wetlands Data for the I-405 Kirkland Nickel Project Study Area

Table B-1: Summary of Wetlands located within the I-405 Kirkland Nickel Project Study Area

Wetland Identifier	Drainage Basin	Area (acres)	Cowardin Classification[1]	Status[2]	Riparian Association
16.2R	East Lake Washington	0.847	POW	N	Yes
16.3L	East Lake Washington	0.031	PEM	D	No
16.5L	East Lake Washington	0.064	PEM	D	No
17.1R	East Lake Washington	0.021	PEM	D	No
17.3R	East Lake Washington	0.048	PEM	D	No
17.7R	East Lake Washington	0.096	PEM	D	No
18.0R	East Lake Washington	0.101	PEM	SD	No
18.05L	East Lake Washington	0.210	PEM	SD	No
18.06L	East Lake Washington	0.047	PEM	D	No
18.1R	East Lake Washington	1.309	PFO	O	No
18.15R	East Lake Washington	0.050	PEM	O	No
18.2R	East Lake Washington	0.068	PFO	O	No
18.3R	Forbes Creek	0.028	PFO	O	No
18.4R	Forbes Creek	0.037	PEM	N	No
19.27R	Forbes Creek	0.105	PEM	N	No
19.3R	Forbes Creek	0.248	PFO	N	Yes
19.5L	Forbes Creek	0.574	PEM	O	No
19.6L	Forbes Creek	0.011	PEM	D	No
19.6R	Forbes Creek	0.051	PEM	D	No
19.7R	Forbes Creek	0.252	PSS	N/D	No
19.8L	Forbes Creek	0.341	PEM	S	No
19.9L	Juanita Creek	0.443	PFO	D	No
19.9R	Juanita Creek	0.087	PEM	D	No
20.0L	Juanita Creek	0.080	PEM	D/S	No
20.34L	Juanita Creek	0.279	PEM	O	No
20.35L	Juanita Creek	0.165	PEM	O	No

Table B-1: Summary of Wetlands located within the I-405 Kirkland Nickel Project Study Area

Wetland Identifier	Drainage Basin	Area (acres)	Cowardin Classification[1]	Status[2]	Riparian Association
20.4L	Juanita Creek	2.759	PSS	N	Yes
21.6L	Juanita Creek	0.093	PFO	D	No
21.7L	Juanita Creek	0.242	PFO	O	No
21.8L	Juanita Creek	0.054	PEM	D	No
22.5L	Sammamish River	0.025	PFO	N	Yes
22.8L	Sammamish River	1.156	PFO	N	Yes
23.2L	Sammamish River	0.307	PFO	O	Yes
TOTAL		10.156			

[1] *See Wetland Deterninations in Section 4.2 of this report for an explanation of Wetland Identifier methodology; PEM = Palustrine Emergent; PFO = Palustrine Forested; PSS = Palustrine Scrub-Shrub; These terms are defined in the Glossary of this document.*

[2] *Status describes the nature of each wetland as follows: D = ditch, SD = stormwater detention facility, N = natural wetland with stormwater detention capabilities, S = seep wetland, O = other wetland*

Table B-2: Wetland Ratings by Local Jurisdiction

Wetland Identifier	Area (acres)	Cowardin Classification	Local Jurisdiction and Rating	Local Jurisdiction Buffer Requirements (feet)	Identified on Local Jurisdiction Wetland Inventory?
16.2	0.847	PFO	Kirkland - 2	75	Y
16.3L	0.031	PEM	Kirkland - 3	50	N
16.5L	0.064	PEM	Kirkland – 3	50	N
17.1R	0.021	PEM	Kirkland – 3	25	N
17.3R	0.048	PEM	Kirkland - 3	25	N
17.7R	0.096	PEM	Kirkland - 3	25	N
18.0R	0.101	PEM	Kirkland - 3	25	N
18.05L	0.210	PEM	Kirkland - 3	25	N
18.06L	0.047	PEM	Kirkland - 3	25	N
18.1R	1.309	PFO	Kirkland - 3	50	N
18.15R	0.050	PEM	Kirkland - 3	50	N
18.2R	0.068	PFO	Kirkland - 3	50	N
18.3R	0.028	PFO	Kirkland - 3	50	N
18.4R	0.037	PEM	Kirkland - 3	50	N
19.27R	0.105	PEM	Kirkland - 3	50	Y
19.3R	0.248	PFO	Kirkland – 2	75	Y
19.5L	0.574	PEM	Kirkland - 3	50	N
19.6L	0.011	PEM	Kirkland - 3	50	N
19.6R	0.051	PEM	Kirkland - 3	50	N
19.7R	0.252	PSS	Kirkland - 3	50	N
19.8L	0.341	PEM	Kirkland - 3	50	N
19.9L	0.443	PFO	Kirkland - 3	50	N
19.9R	0.087	PEM	Kirkland - 3	50	N
20.0L	0.080	PEM	Kirkland – 3	50	N
20.34L	0.279	PEM	Kirkland – 3	50	Y
20.35L	0.165	PEM	Kirkland – 3	50	Y
20.4L	2.759	PSS	Kirkland - 2	75	Y
21.6L	0.093	PFO	King Co. - 4	50	N
21.7L	0.242	PFO	King Co. - 4	50	N
21.8L	0.054	PEM	King Co. - 4	50	N
22.5L	0.025	PFO	King Co. - 3	75	Y
22.8L	1.156	PFO	Bothell - 3	50	N
23.2L	0.307	PFO	Bothell - 2	75	N
TOTAL	10.571				

Table B-3: Wetland Functions and Values, I-405 Kirkland Nickel Project Study Area

Wetland Identifier[1]	Area (acres)	Cowardin Classification[2]	Washington State Rating[3]	Flood Flow Alteration	Sediment Removal	Nutrient & Toxicant Removal	Erosion Control & Shoreline Stabilization	Production of Organic Matter and its Export	General Habitat Suitability	Habitat for Aquatic Invertebrates	Habitat for Amphibians	Habitat for Wetland-Associated Mammals	Habitat for Wetland-Associated Birds	General Fish Habitat	Native Plant Richness	Educational or Scientific Value	Uniqueness and Heritage
16.2R	0.837	PFO	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓
16.3L	0.031	PEM	4				✓	✓									
16.5L	0.064	PEM	4		✓		✓	✓									
17.1R	0.021	PEM	4		✓	✓		✓									
17.3R	0.048	PEM	4		✓	✓		✓		✓							
17.7R	0.096	PEM	4		✓	✓		✓									
18.0R	0.101	PEM	4					✓									
18.05L	0.210	PEM	4	✓	✓	✓			✓								
18.06L	0.047	PEM	4		✓	✓		✓									
18.1R	1.309	PFO	4				✓	✓	✓	✓							
18.15R	0.050	PEM	4		✓	✓		✓									
18.2R	0.068	PFO	4		✓	✓		✓									
18.3R	0.028	PFO	4		✓	✓		✓									
18.4R	0.037	PEM	4	✓	✓	✓											
19.27R	0.105	PEM	4	✓	✓	✓	✓	✓	✓								
19.3R	0.248	PFO	3		✓	✓		✓	✓						✓		
19.5L	0.574	PEM	4	✓	✓	✓		✓		✓							
19.6L	0.011	PEM	4		✓												
19.6R	0.051	PEM	4		✓	✓		✓									
19.7R	0.252	PSS	4	✓	✓	✓		✓		✓							
19.8L	0.341	PEM	4					✓									
19.9L	0.443	PFO	3		✓	✓		✓									
19.9R	0.087	PEM	4	✓	✓	✓		✓									
20.0L	0.080	PEM	4		✓	✓		✓									
20.34L	0.279	PEM	3	✓	✓	✓			✓	✓							
20.35L	0.165	PEM	4		✓	✓		✓									
20.4L	2.759	PSS	2	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
21.6L	0.093	PFO	4				✓	✓	✓	✓							
21.7L	0.242	PFO	4	✓	✓	✓		✓	✓								
21.8L	0.054	PEM	4		✓			✓									
22.5L	0.025	PFO	3	✓	✓	✓		✓	✓	✓	✓				✓	✓	
22.8L	1.156	PFO	3	✓	✓	✓	✓	✓	✓	✓		✓		✓			
23.2L	0.307	PFO	3	✓	✓	✓	✓	✓	✓	✓		✓			✓		
TOTAL	10.156																

[1] PEM – Palustrine Emergent; PFO – Palustrine Forested; PSS – Palustrine Scrub-Shrub
*[2] ✓ = function **likely** provided by this wetland*
[3] Hruby, 2004

Wetland Determination Summary

Project biologists delineated 33 wetlands totaling approximately 10.156 acres within the study area for the Kirkland Nickel Project. The wetlands are located within four basins crossed by the project: East Lake Washington (Yarrow Creek), Forbes Creek, Juanita Creek, and Sammamish River.

Thirty-one of the 33 wetlands (78 percent) within the study area are relatively small (less than one-third acre). The two largest wetlands are located in the Juanita Creek and Sammamish River basins and are 2.76 acres and 4.09 acres, respectively, and both extend outside the project area. Two of the eight wetlands sized one-third acre or larger are located within the Juanita Creek basin, while the other large wetlands are spread across the other basins. The Sammamish River basin has the highest proportion of large versus small wetlands (two of three wetlands). The largest wetland in the study area (Wetland 20.4L), covering 2.76 acres, is in the Juanita Creek basin. The East Lake Washington basin contains only three of 15 wetlands larger than one-third acre.

Twenty-four of the 33 total wetlands (75 percent) are rated as Category IV wetlands (the lowest-value class) per Ecology (Hruby, 2004). Seven Category III wetlands were found within all the different basins in the study area. One Category II wetland is located in each the East Lake Washington and Juanita Creek basin. No Category I wetlands occur within the study area.

Twenty-eight of the 33 wetlands (70 percent) are dominated by emergent and/or scrub-shrub vegetation. Since forested wetlands are generally larger and located beyond the maintained road rights-of-way, about 30 percent of the wetlands within the study area were classified as forested per Cowardin et al. (1979).

Wetland Functions and Values Summary

Wetlands delineated in the Kirkland Nickel Project study area were evaluated for functions and values using the WSDOT *Wetland Functions Characterization Tool for Linear Projects* (Null et al., 2000). The WSDOT tool is a qualitative method of assessing wetland functions for wetlands along linear corridor projects, as described previously. A Wetland Functions Field Data Form was completed for each wetland in the study area (see Appendix C). Table B-3 of Appendix B summarizes the information collected on each data sheet.

Generally, larger wetlands in the study area are typically located in flat, low-lying areas. The smaller wetlands are most often located in small closed topographic depressions, or are hydrologically connected to hillside seeps, or roadside drainage ditches. Because of their size and topographic location, larger wetlands within the study area are more likely to provide a higher number and higher value of beneficial functions than smaller wetlands. Seventeen of the wetlands within the study area are stormwater facilities or stormwater conveyance swales or ditches. Eleven of these appear to have been constructed on, or are modifications to, pre-existing wetlands.

All of the study area is located within the urban growth area, with most of the study area comprised of existing road rights-of-way. All of the wetlands within the study area have been disturbed to some extent by development, including the construction of I-405 and development in the surrounding area. This has affected the ability of the wetlands to provide the beneficial functions identified by Null et al. (2000).

Less than one-half of the wetlands were found to have the potential to provide valuable stormwater management functions including: flood flow alternations, sediment removal,

nutrient and toxicant removal, and erosion control. Less than one-fourth of the total number of wetlands are likely to provide value related to general habitat, habitat for amphibians, fish, and/or birds, or native plant richness. Two wetlands (Wetlands 16.2R and 20.4L) are likely to provide uniqueness or heritage value. In addition, two wetlands (Wetland 20.4L and Wetland 22.5L) are likely to provide educational or scientific value. Two of the wetlands are likely to provide general value as fish habitat (Wetland 20.4L and Wetland 22.8L).

Appendix C:

Wetland Data Sheets